PUBLIC WORKS

Sept.
1956

CITY, COUNTY AND STATE

Infiltration-Exfiltration Ratios for SEWER DESIGN page 97

How to Make RURAL TRAFFIC COUNTS page 99

Studies of PEAK WATER DEMANDS Show Needs For Pumping and Storage page 111

How New York City Cleans 5700 MILES of STREETS page 106

City and County SANITARY FILL Operation pages 102 and 104

COMPLETE CONTENTS LIST ON PAGE 5

Albert G. Wyler, Director of Streets for City of New Orleans, La., is in charge of design, construction and maintenance streets and bridges and traffic control.

UNIVERSITY MICROFILMS
313 N 1ST ST
ANN ARBOR MICH M-4
9

From Sub-base to Finished Surface

GALION ROLLERS

Do the Best Job!

Contractors and public officials all over the world have found GALION Rollers to be the most satisfactory answer to their compaction jobs — and the most economical. No matter whether it is a simple patching job, a tremendous fill, or miles of smooth finished surface — you will find GALION Rollers offer you features that have made them the "most used" Rollers in the world.

WORLD'S LARGEST MANUFACTURER of ROLLERS

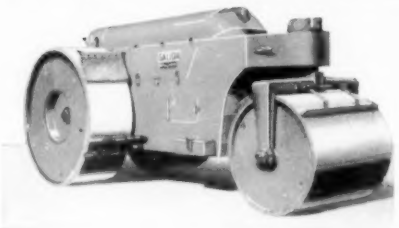
ESTABLISHED GALION 1907

MAIL THIS COUPON FOR COMPLETE INFORMATION

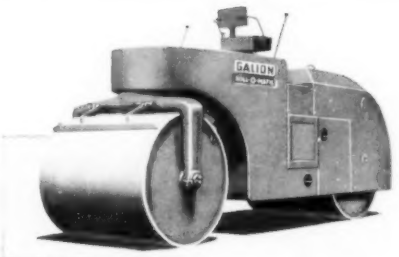
THE GALION IRON WORKS & MFG. CO.
General and Export Offices, GALION, OHIO, U.S.A.
Cable address: GALIONIRON, Galion, Ohio

THREE-AXLE TANDEM ROLLER with ROLL-O-MATIC Torque Converter Drive. Variable Wt. 14-20 Ton.

THREE-WHEEL ROLL-O-MATIC ROLLERS Spoke-Type or Variable Weight Rolls.
"WARRIOR" 2 sizes–7 to 10 Ton.
"CHIEF" 4 sizes–10 to 16 Ton.

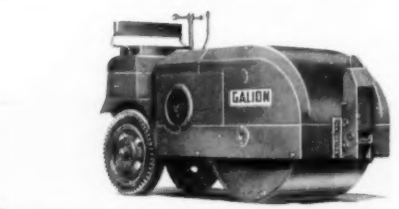


TWO-AXLE TANDEM ROLLERS with ROLL-O-MATIC or Gear Shift Drive. Variable Weight 5-8, 8-10½, 8-12, or 10-14 Ton.



SMALL TANDEM ROLLERS 3-5 Ton Variable Weight 4-6 Ton with Retractable Wheels.

PORTABLE ROLLER Variable Weight 7100-9765 lbs.



TRENCH ROLLER Variable Weight 8785-10220 lbs.

THE GALION IRON WORKS & MFG. CO.

Dept. P-96 Galion, Ohio, U.S.A.

Please send me the literature checked:

- ☐ 2-Axle Tandem
- ☐ 3-Axle Tandem
- ☐ Small Tandem
- ☐ Three-Wheel
- ☐ Portable
- ☐ Trench

BUILDS BETTER ROADS TODAY FOR A GREATER AMERICA

See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957

PERSON _____ TITLE _____

FIRM _____

STREET _____

CITY _____ STATE _____

Will you give us a hand AND HELP YOURSELF

Once a year we have to verify your name and address . . . so we can keep on sending you PUBLIC WORKS.

All year long you like to get up-to-date service information about new products . . . new equipment . . . that will help make your job easier.

The attached postage-free card does both jobs at the same time. Just circle the numbers of the important catalogs you want (you'll find them described on pages 40 to 60 and 219 to 223). Then sign and mail the card today.

STOP **READ** **AND** **SEND**

9-56

USE THIS CARD to get detailed information!

on products and materials mentioned in this issue. Circle numbers below and mail today.

Booklets from pages 40 to 60

20 26 33 37 43 46 49 50 51 59 66 68
76 88 91 94 95 109 110 116 117 118 119 121
135 137 139 140 143 155 158 161 180 182 185 187
188 189 194 204 206 207 210 211 213 216 217 220
239 245 247 249 263 265 271 272 274 277 278 286
294 295 303 307 308 309 312 319 331 332 336 350
351 353 356 359 361 362 370 371 373 380 383 385
388 389 394 399 402 406 407 412 414 426 427 428
437 439 440 441 442 450 453 457 463 467 468 479
482 483 484 491 493 497 499 504 505 506 507 508
509 510 511 512 513 514 515 516 517 518 519 520
521 522 523 524 525 526 527 528 529

New Products, pages 219 to 223

9-1 9-2 9-3 9-4 9-5 9-6 9-7 9-8 9-9 9-10 9-11 9-12
9-13 9-14 9-15 9-16 9-17 9-18 9-19 9-20 9-21 9-22
9-23 9-24 9-25 9-26

Name.....

Occupation.....

Street.....

City..... State.....

NOT GOOD AFTER OCT. 15, 1956 ◀ MAIL THIS CARD NOW

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

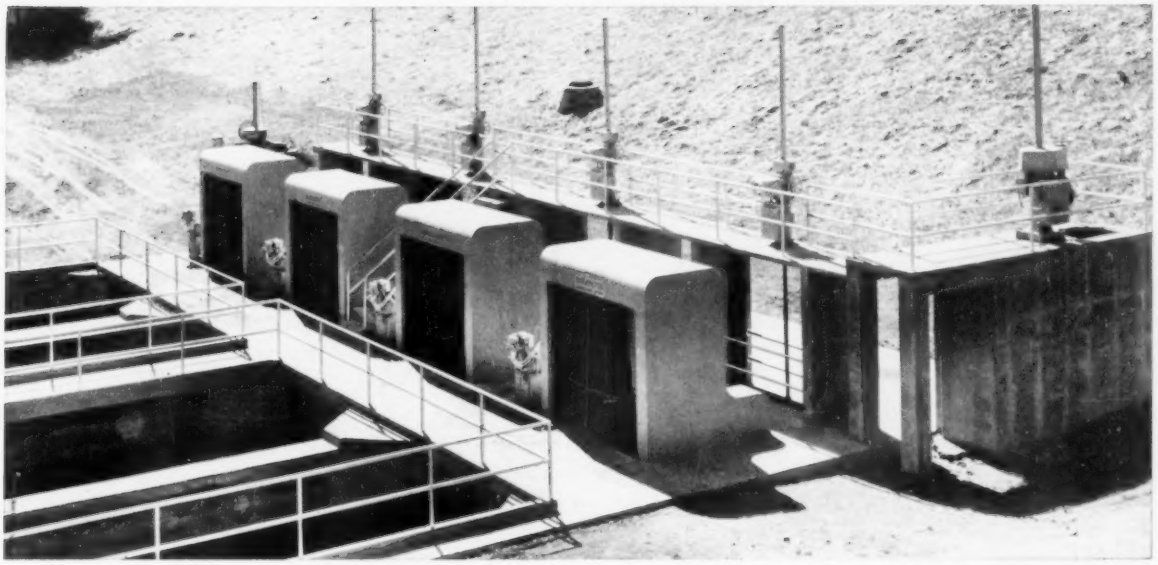
First Class Permit No 7, Ridgewood, New Jersey

READERS' SERVICE DEPT.

PUBLIC WORKS Publications

200 SOUTH BROAD STREET

RIDGEWOOD, N. J.



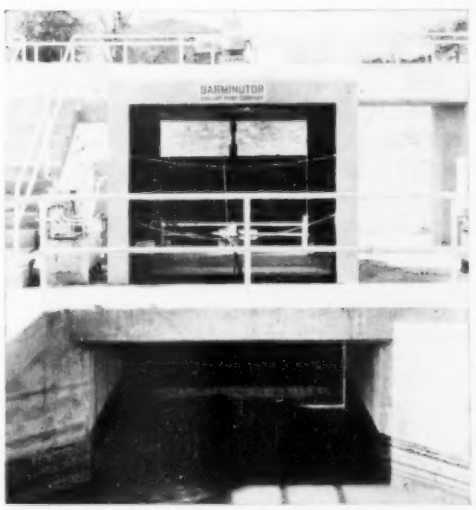
The illustration above shows the primary grit channels, four BARMINUTORS and motorized gates at the Indianapolis, Indiana sewage treatment plant. Design of plant by Moore and Heger, Consulting Engineers, Indianapolis; constructed by H. D. Tousley Company, Inc., Indianapolis, for the Indianapolis Sanitary District, Mr. Dwight O. Bender, Superintendent.

Comminution with BARMINUTORS® at Indianapolis

The BARMINUTOR screening and comminuting machine provides continuous screening and comminution of coarse material in sewage, insuring continuous raw sewage flow into the sewage treatment plant without excessive increase of water level.

Over 4000 COMMINUTOR screening and cutting machines installed since their development by the Chicago Pump Company 21 years ago stand behind the BARMINUTOR screening and comminuting machine. Thorough testing has also proved its dependability.

Write Department F for descriptive literature and engineering data.



NO SCREENING HANDLING PROBLEMS— SIMPLE LOW COST MAINTENANCE

The BARMINUTOR screening and comminuting machine eliminates raking, burial, incineration and grinding. Operation is clean and continuous, solids never leave the influent channel. Manual attention is unnecessary except for periodic lubrication, inspection and cutter sharpening. Design of cutting parts permits low cost replacement. Power requirements are lower than for mechanically raked screens and grinders. Since all cutting is done above the grit line, wear is greatly reduced.

fmc FOOD MACHINERY AND CHEMICAL CORPORATION ®

CHICAGO PUMP COMPANY

Subsidiary of Food Machinery and Chemical Corporation

SEWAGE EQUIPMENT DIVISION

422 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Flush Kleen ®, Scru-Peller ®, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers . . . Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Barminutor ®, Comminutors.

Using the sanitary landfill method of garbage disposal, Vancouver turned waste land into this spacious park. From start to finish, sanitary landfill is a healthful, economical operation.

This bicycle track was used for the British Empire games — another example where Vancouver used sanitary landfill to convert property that was a liability into an asset.

HOW VANCOUVER'S MODERN GARBAGE DISPOSAL PRODUCES PARKS AND PLAYGROUNDS

This Cat D7 Tractor with No. 7A Bulldozer is one of two D7s used by Vancouver in its sanitary landfill program. Because this method is healthful every step, it can be utilized to improve property close to homes.

Vancouver, B. C., with a population of more than 393,000, has used the sanitary landfill method to dispose of its garbage since 1944. The result: low-cost disposal and parks and playgrounds like those shown here. During the transition stage, these areas were free of the rats, mice, stench and smoke that contaminate the old-fashioned dump. As its name implies, sanitary landfill is a healthful program, beneficial to a community every step of the way.

Key machines in Vancouver's program are two CAT* D7 Tractors with No. 7A Bulldozers. These machines perform the functions required to convert dumps to parks and other useful and valuable property. As one area is reclaimed, another is started. This program assures Vancouver of safe, sanitary disposal of garbage and refuse and a gain in useful land area.

The D7s work eight hours a day, five days a week, delivering economical, dependable performance. Just as efficient are the other items of Caterpillar-built equipment available for sanitary landfill work. There are five other sizes of tractors and bulldozers to fit any size of operation. In addition, three completely modern Traxcavators*, the No. 977, No. 955 and No. 933, are popular and versatile tools for sanitary landfill and other municipal jobs. The Hyster Hystaway crane mounted on a 'dozer-equipped D6 or D7 is another useful tool. A complete line of five sizes of crawler-drawn scrapers is also available.

On *any* job, you can count on Cat-built machines for *more* work at *less* cost with *less* down time. Get the details from your Caterpillar Dealer!

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U. S. A.

WANT MORE DETAILS ON SANITARY LANDFILL? SEND IN THIS COUPON TODAY, listing your community's population, and you'll receive facts on how a town your size can make economical, useful riddance of refuse.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

Gentlemen: Please send me details on sanitary landfill.

Name_____

Title_____

Street_____

City_____ Zone____ Province_____ Population_____

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

WHEN YOU THINK OF PUBLIC HEALTH, THINK OF THE BIG YELLOW MACHINES THAT GUARD IT

OFFICERS

W. A. Hardenbergh, *President*
L. C. Morris, *V. Pres. and Treas.*
Edward B. Rodie, *Secretary*

EDITORIAL DEPARTMENT

A. Prescott Folwell
Editor Emeritus

W. A. Hardenbergh
Editor

Edward B. Rodie
Managing Editor

C. H. Billings
Frank E. Force
Helen E. Quinn
Associate Editors

D. A. Okun
L. J. Ritter, Jr.
Technical Consultants

Nathaniel Pousette-Dart
Art Director

BUSINESS DEPARTMENT

Lewis C. Morris
General Manager

I. James Barger
Assistant Manager

Arthur K. Akers
Director, Advertising & Research

ADVERTISING OFFICES

Ridgewood, N. J., 200 So. Broad St.
W. S. Morris, *Eastern Sales Mgr.*
R. F. Buehler

Cleveland 10, Ohio, Villa Beach 2,
15445 Lake Shore Blvd.
Burton M. Yost, *District Mgr.*

Chicago 11, Ill., 612 N. Michigan Ave.
Robert J. Shea, *Mid-West Sales Mgr.*

Los Angeles 36, Calif.
5478 Wilshire Blvd.
Hugh Hollyday, *% Smith & Hollyday*
David W. Zander

San Francisco 4, Calif., Russ Building
Bill Smith, *% Smith & Hollyday*

Kansas City 5, Mo., Graphic Arts Bldg.
C. H. Stockwell

BPA

Public Works T. M. Reg. U.S. Pat. Off.

Established 1896

Published Monthly by Public Works Journal Corporation. Office of Publication at Orange, Conn. Editorial and Advertising offices at 200 So. Broad St., Ridgewood, New Jersey. Subscription rates: U.S.A. and possessions, $5.00. Canada and South America, $6.00. All other countries, $7.00. Accepted as controlled circulation publication at Orange, Conn.

Copyright 1956 by
PUBLIC WORKS JOURNAL CORP.
200 So. Broad St., Ridgewood, New Jersey

PUBLIC WORKS MAGAZINE

CONTENTS

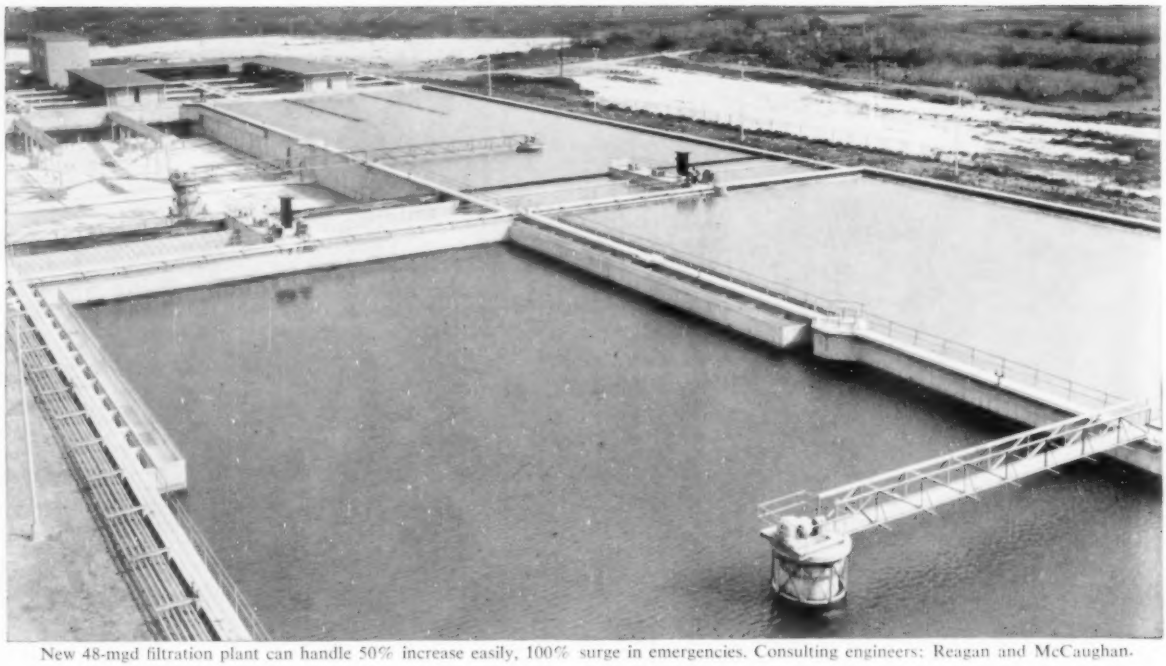
SEPTEMBER, 1956 **Vol. 87, No. 9**

New Data on Sewer Infiltration-Exfiltration Ratios. *By Sherwood Borland* 97
Rural Traffic Counts are Not Hard to Get. *By William C. Burnett* 99
Perimeter Sanitary Landfill for Dallas Refuse Disposal. *By G. C. Brinkley* 102
Country Refuse Collection and Disposal Provides Needed Service. *By Desso T. Mitchell* 104
Mechanized Street Cleaning in New York City. *By Andrew W. Mulrain* 106
Analysis of Peak Water Demands. *By Jerome B. Wolfe and John F. Loos* 111
Sewer Construction Methods in Wet and Soft Ground 115
County Makes Year-Round Preparations for Battle with Snow *By Robert T. Carrier* 117
Akron Uses "Permanent Dust Treatment" on Unpaved Streets. *By H. A. Mathews* 120
Modernization of Refuse Disposal Plants Adds Needed Capacity. *By Henry R. Patterson* 122
Leak Detection Program Saves 390 MGD. *By Phil Hirsch* 124
Highway Weed and Brush Control. *By Homer Jacobs* 126
How Design of a Sewage Treatment Plant Reduced Expansion Problems 129
Steps in Solving a City's Parking Problem. *By C. Leland Wood* 130
Air Conditioning Brings Water Problems. *By Lester D. Kempton* 132
Two-Way Radio Used in Maintenance and Construction. *By North H. Newton* 135
A County Finds Many Uses for Aerial Photos. *By Melvin B. Larsen* 137
Public Relations on a Highway Construction Job. *By K. R. McDonald* 139
Emergency and Disaster Planning for Water and Sewerage 146
Industry and Essentials Affecting Community Development. *By J. Ferd. Holtmann* 150
Pump Station Applies Automation to Flood Control. *By James Joseph* 154
Installing and Maintaining an Aluminum Diving Board. *By Norman R. Miller* 164
Engineering Manpower a Critical Problem for Highway Departments. *By Timothy A. Harrison* 176
Steam Cleaner Helps in Snow and Ice Control 190

The Water Works Digest 168
The Highway and Airport Digest 180
The Sewerage and Refuse Digest 192
The Industrial Waste Digest 204

The Editor's Page 7
Leader in Public Works 26
The Engineers' Library 40
Books in Brief .....62 and 200
Public Works Legal Notes *By Melvin Nord* 70
Up Front for Adequate Roads *By Leo J. Ritter* 78
Public Works Engineering Notes 88
APWA News 141
New Public Works Equipment 219
Worth Seeing 227
Worth Telling *By Arthur K. Akers* 228

THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES



New 48-mgd filtration plant can handle 50% increase easily, 100% surge in emergencies. Consulting engineers: Reagan and McCaughan.

CORPUS CHRISTI, TEXAS

Produces pure, clear water from muddy Nueces River

with LINK-BELT collectors . . . mixers . . . chemical handling system

TYPE SC CIRCULINE SLUDGE COLLECTORS, with pivoted rakes at ends of arms, adjust to collect sludge in corners of basin.

STRAIGHTLINE SLOW MIXERS are used in primary and secondary chambers. Detention time: 45 minutes at 48 mgd capacity.

LINK-BELT SCREW CONVEYORS AND BUCKET ELEVATORS distribute lime, sulphate and alum to tanks for live or reserve storage.

WATER from the Nueces River supplying Corpus Christi is hard and muddy. To provide ample water for the rapidly expanding population—which has doubled each decade since 1920—treatment facilities featuring Link-Belt equipment were installed at the new O. N. Stevens water filtration plant. A two-stage treatment provides rapid and thorough solids removal . . . effectively reduces the river's 142 ppm hardness.

Link-Belt is supplying specific answers to specialized water, sewage and waste treatment problems for municipalities and industries throughout the country. A broad line of screens, collectors, mixers, conveyors and power transmission equipment offers durability that minimizes maintenance . . . helps you plan your requirements for the years ahead.

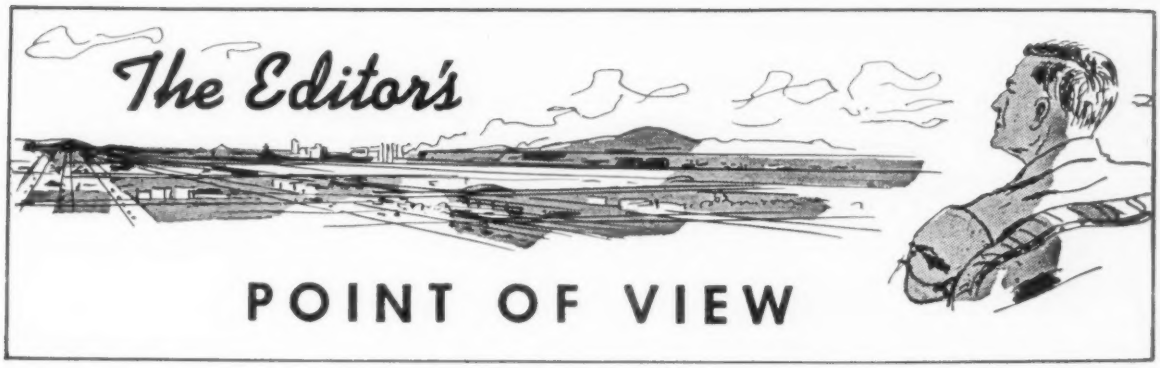
Let our engineers work with you, your chemists and consultants to assure top efficiency at all flow conditions. Call your nearest Link-Belt office for consultation with a sanitary engineering specialist.

14,124

LINK-BELT

SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.



More Adequate Compensation for Engineers in the Military Services

THE SUCCESS OF the medical and dental professions in getting increased compensation for their members in the various services—including the Army, Navy, Air Force and Public Health Service—raises the question why engineers do not get at least proportionate, if not equal, recognition. They, too, are a scarce category; they provide an essential service; and their technical skill is not easy of attainment.

Yet, much as we favor such increased pay and consider it but simple justice, we cannot feel optimistic over the chance of getting it. For this, engineers themselves are largely to blame. It is doubtful if there is today a hard and fast definition of what it takes to be an engineer. Registration of engineers and restriction of engineering work to registered engineers have come slowly and perhaps grudgingly. Only lately have there been steps toward certification on a national scale; and that, as yet, applies to but one group. Not the least of the problems is the composition of the Corps of Engineers of the Army and Air Force and the qualifications of some of their officers.

It would be fine to see engineering organizations get together in a unified effort and make a start on the solution of the problems that are now hindering the recognition that engineers should have. We hope a start will be made.

Mechanization For Engineering

ENGINEERS of today may be better trained than their fathers, but they can run no more miles of levels or centerline, nor can they "shoot" any more topography in a working day than their fathers could. Actually, because working hours are likely to be less, the day's work may be smaller. All of this means a much higher price must be paid for field work; the cost per mile has risen tremendously. And in the office, the same applies to computations, preparing drawings and writing specifications.

If the cost were the only problem it might not be so bad; but the time element also enters. There is much work to be done and not enough engineers to do it by the old methods. Our proposed national highway program, for instance, cannot be constructed on schedule unless engineering for it is speeded up.

Engineering work needs to be mechanized, just as the tools for excavation, filling, grading and paving have been mechanized. A start has been made to supplement engineering with mechanical equipment. Airphotos have been developed to the point where they can furnish much of the field data needed; now further use must be made of computing and reproducing equipment; details of design must be standardized. These are a few of the channels along which every engineering office should be thinking. Much can be done to multiply what an engineer can do.

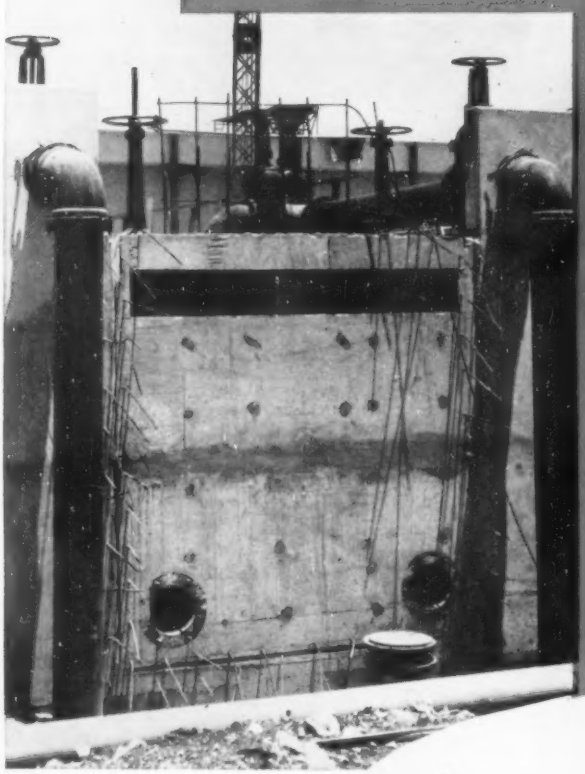
Looking Backward

FORTY YEARS measured on the cycle of time is insignificant; yet it sometimes helps to get a proper perspective to look back at the changes even such a brief period of time can illustrate. Forty years ago, the units now generally grouped under public works departments of cities were largely compartmented; it was unnecessary for them to work together—water man; sewerage foreman, if any; engineer; street superintendent; refuse collector—each went his merry and independent way. Mostly these men lacked technical training; they came up from the ranks. They knew how to handle labor; but equipment, as we know it now, they did not have.

No city could long survive chaos today if each of these groups worked separately, shut off from one another by mutual ignorance of the other's duties; and with no understanding of the technical phases of these duties. Today, there is a high level of technical skill, a broad knowledge of the operations of other divisions and, with these, a growing trend to make the capable man responsible for a wider variety of jobs. The organization for public works of the modern city recognizes and relies on these facts.

Our cities have come a long way in forty years, in better organization in the employment of more highly qualified technical skills, and in the sounder use over broader fields of these skills. They need to continue this progress.

Used so many ways



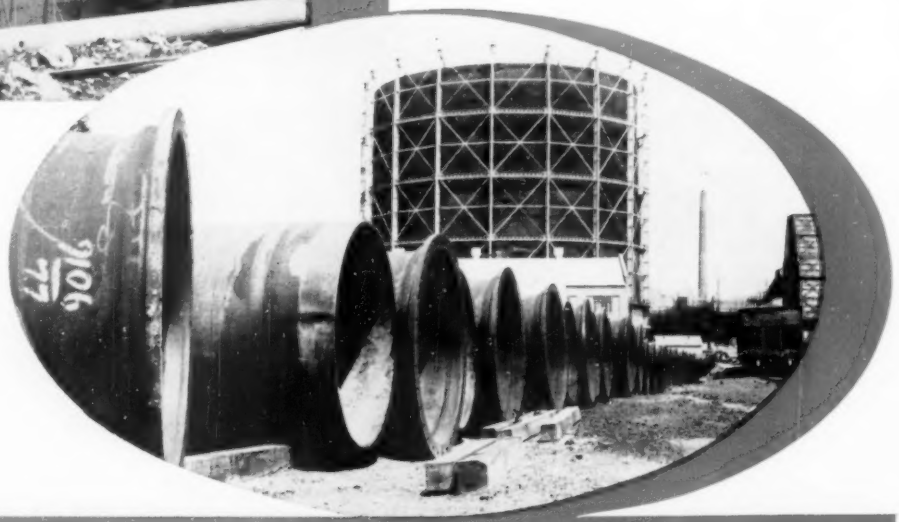
Never a doubt about cast iron pipe, no matter for what purpose you use it. And there are so many ways to put its rugged reliability to work for you. In *water* service, for fire protection and supply lines, feeder and distribution mains, purification plants. In *gas* service, mechanical joint cast iron pipe for distribution and feeder mains. In *sewerage* service, for force mains, outfalls and treatment plants. And in *industrial* service, uses too numerous to catalog. For information, write Cast Iron Pipe Research Association, Thomas F. Wolfe, Managing Director, 122 So. Michigan Avenue, Chicago 3, Illinois.

CAST Q IRON

The Q-Check stencilled on pipe is the Registered Service Mark of the Cast Iron Pipe Research Association.

(above) Installation of mechanical joint and flanged cast iron pipe carrying salt water for Oceanarium, "Marineland of The Pacific" at Portuguese Bend, Calif.

(at right) 48" mechanical joint cast iron pipe for gas main at Indianapolis, Ind.



CAST IRON PIPE

—always with confidence

(at left) Installing 12,000' of 24" mechanical joint cast iron pipe for water feeder main at Omaha, Neb.

(at right) Cast iron pipe for sewage treatment plant at Panama City, Fla.

36" mechanical joint cast iron pipe for outfall sewer line at Los Angeles, Calif.

SERVES FOR CENTURIES...

ASPHALT pavement serves with only <u>one</u> 2-inch

You're in Tacoma, Washington . . . looking South from 11th Street along South Tacoma Avenue.

Notice the smooth-riding, continuous surface—muffling traffic roar to a whisper. No cracks or worn spots, either. This is a 2-inch Asphalt resurfacing placed in 1947—right on top of earlier Asphalt paving laid way back in 1890!

For over fifty-seven years the *original* Asphalt pavement efficiently served Tacoma taxpayers. *Now* . . . modernized with a new 2-inch layer of Asphalt hot-mix pavement, it's well into its second half-century of dependable, economical service.

What makes Asphalt pavements last so long?

One thing, they seal out damaging moisture . . . roof over their own structure . . . keeping the underlying base and foundation dry and firm.

Second, they're not affected by de-icing salts that usually damage other types of pavement.

Third, they're resilient, rugged. They withstand the pounding of heaviest traffic.

Fourth, they hug their foundation, accommodate themselves to settlements and shifts.

Mr. L. P. Staman, Tacoma's Director of Public Works (left), points out to Mr. Myron D. Calkins (right), Tacoma's City Engineer, why city prefers Asphalt pavement: "We're still getting a return on every tax dollar that Tacoma has ever spent for Asphalt pavement... as the South Tacoma Avenue story shows. We like to use it, too, because it is ready for traffic almost immediately after it's laid. That's important to us because it reduces traffic tie-up and it's quiet, too."

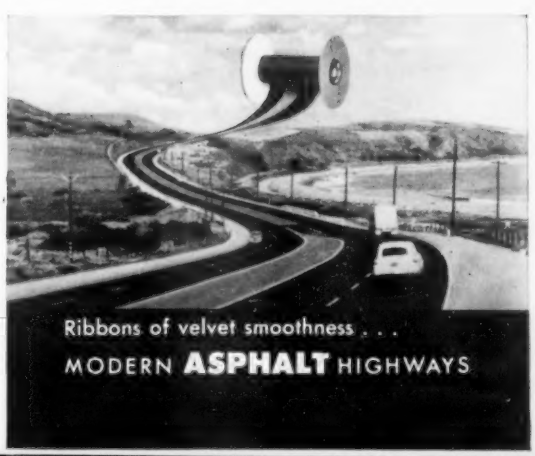
Tacoma 67 years resurfacing

Fifth. Asphalt pavements are the quickest and easiest to restore after utility tear-ups.

You can be sure of this...

Modern, smooth-riding Asphalt pavement will give your community the most pavement for the money . . . and the most durable.

THE ASPHALT INSTITUTE
Asphalt Institute Building
College Park, Maryland



"Years of lowest downtime"

back preference for schedule-beating International® Equipment . . .

Foreman Milton D. Peterson and Supt. H. L. Radandt beside one of Radandt's new Payscrapers.

It's a $394,000 relocation and regrading job of Wisconsin 27, between Ojibwa and Ladysmith—involving clearing, grading, culverts, and sand gravel fill up to base course. Approximately ½ million cu. yds. of excavation and borrow to do.

Cuts as deep as 21 feet are required—and one 32-foot fill is necessary, because of a 22-foot deep marsh excavation, to base new road on firm footing.

A 12-unit International prime mover fleet—pushers, dozers, rubber-tired Payscrapers®, and crawler-scraper team—is what Contractor H. F. Radandt, Inc., banks on to "wind 'er up," ahead of the Wisconsin winter, with a profit!

"Have been using International crawlers since 1946," states Supt. H. L. Radandt, for the contracting firm. "Presently we have nine International crawlers and three Payscrapers in the fleet. Years of actual operation have proven International equipment had given us good service with lowest downtime. We do all our own repair work, and International design is simple to work on."

Prove how exclusive Planet Power steering with full-time live power on both tracks, plus finger-tip operating ease, give the International TD-24 exclusive production-boosting advantages! Compare capacity of new bonus-powered International equipment to anything else on tracks or wheels. Find out what International unit assembly construction means for overhaul speed and simplicity—for reduced downtime—for new upkeep economy. See your nearby International Construction Equipment Distributor for a demonstration!

"The new design 75 Payscraper bowl loads and unloads, fast and easy," declares Supt. Radandt. "Estimated average load: 18 pay yards." Here, loading time with TD-24 as pusher, the 75 heap-loads in 45-60 seconds, in silt-sand-gravel mixture!

Dumping of the new 75 Payscraper takes only 10 seconds. Higher apron lift, and bigger apron opening assure new dumping speed and positive clean-out ability. The new Payscraper's high horsepower - to - capacity ratio permits rapid acceleration to 24 mph top speed — a big yardage-booster!

The three Payscrapers in the Radandt fleet average 2200 cu. yds. per 10 hours—on a 6300 lineal-foot round trip. "The new '75' has matched engine power to deliver the payload fast, and flotation to take roughest pit or haul-road conditions," adds Mr. Radandt.

This torque-converter TD-24 is one of three International crawlers towing scrapers on the job—hauling up to 1000 lineal feet one way. With 200 net engine hp and full-time traction power on both tracks with Planet Power steering, this outfit hauls fill dirt into one of the 22-ft. deep cuts.

Another TD-24—a veteran in the Radandt fleet—spreads and compacts fill dirt on one of the marsh-excavated spots. TD-24 Planet Power steering is particularly productive on all blade work. Full-time live power on both tracks results in faster cycles, bigger loads.

—by H. F. Radandt, Inc.,

Eau Claire, Wisconsin

See you at
the ROAD SHOW—CHICAGO
Jan. 27 to Feb. 4, 1957

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

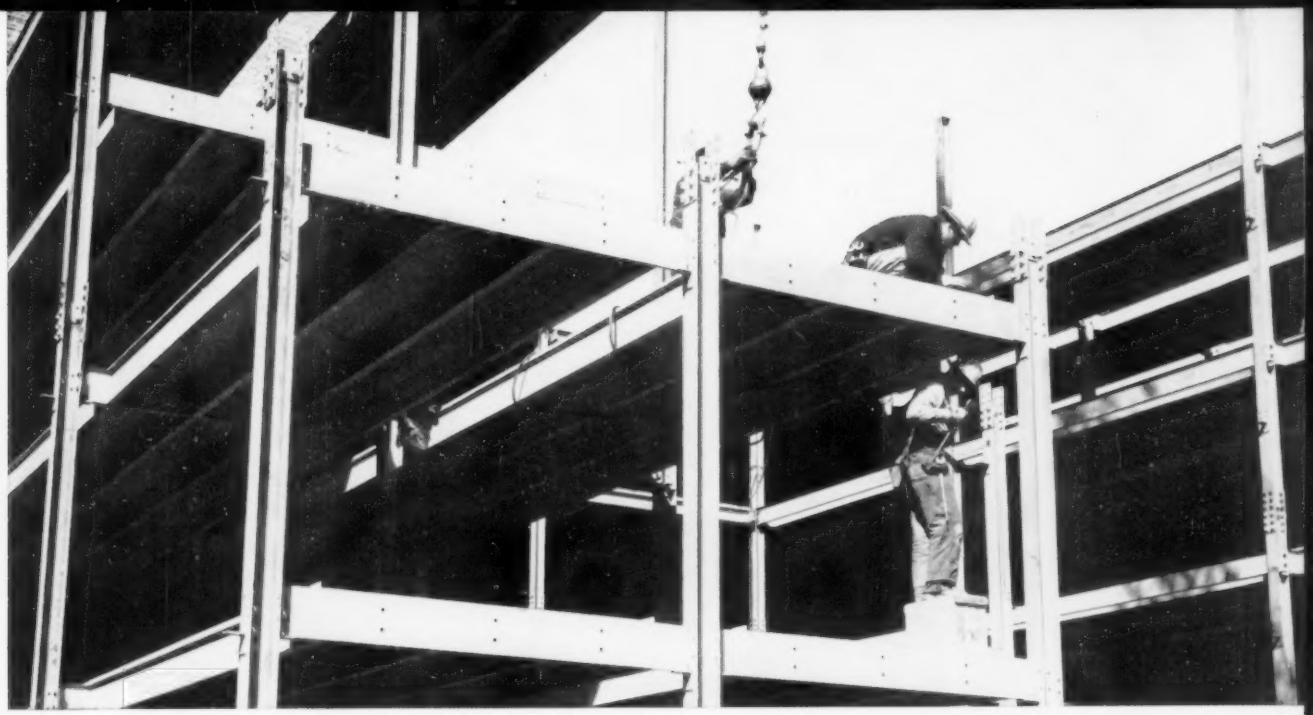
International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

Hotel West Park and Shop Garage, L. B. Longnecker, Owner. **General Contractor and Architect**—W. A. Klinger, Sioux City, Iowa.

"Economy Package"

Structural Steel framework during erection. The 500 tons of Structural Steel were fabricated by the Missouri Valley Steel Company, Sioux City, Iowa.



Connections were made between all structural members by means of bolts—one of the fastest and quietest methods of erection.

parking garage

virtually an all-steel structure

This unique, four-deck parking garage in Sioux City, Iowa, comes as close to being a prefabricated building as is possible without actually being one. The 500-ton Structural Steel framework was erected and bolted in jig time. 223 tons of USS Multigrip steel floor plate were laid. Wiring and a minimum of brickwork were accomplished, and the job was done. Total erection time—8 weeks.

For low-cost, fast construction, where strength is of vital importance, Structural Steel is the only practical material to use. Its architectural versatility encourages its use in virtually every type of municipal undertaking, from schools to government buildings to airports.

Here's what Structural Steel has to offer you:

1. Structural Steel is the *strongest*, yet most economical of load bearing materials.

2. Structural Steel will withstand more abuse than other structural materials, effectively resisting torsion, tension, compression and shear.

3. Once enclosed in buildings, it lasts indefinitely—requiring no maintenance.

4. Structural Steel may be bolted, riveted, or welded . . . can be erected in any weather in which men can work.

5. Steel members are fabricated indoors; therefore, weather can have no effect on the quality of workmanship.

USS STRUCTURAL STEEL

SEND FOR THIS FREE BOOK NOW

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE The United States Steel Hour. It's a full-hour TV program presented every other week by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

United States Steel Corporation
525 William Penn Place, Room 5477
Pittsburgh 30, Pennsylvania

Please send me a free copy of HOT ROLLED CARBON STEEL SHAPES AND PLATES.

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE

Now!—The *NEW*

model 60 *with* 4+

AUSTIN-WESTERN

CU. YD. CAPACITY

Largest Capacity Motor Sweeper Ever Made with ALL These TIME-TESTED FEATURES

FRONT STEER for Unmatched Maneuverability

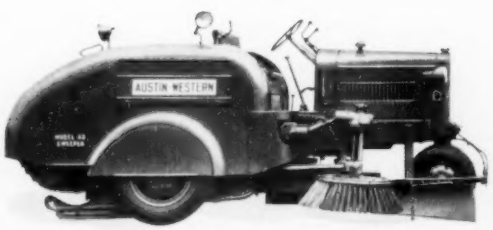
FULL VISION OPERATION for Absolute Safety

REAR DUMP for Speed and Efficiency

DOUBLE GUTTER BROOMS for Maximum Versatility

SMALL or LARGE...whatever your preference there's an A-W Motor Sweeper to fit your need

Model 40



Model 60

See the Model 40 and the NEW Model 60 at the

1956 A. P. W. A. CONGRESS

September 23 - 26 • Booth A-43 • Fort Worth, Texas

WILL ROGERS MEMORIAL AUDITORIUM

Power Graders • Motor Sweepers • Road Rollers • Hydraulic Cranes

BALDWIN BLH LIMA-HAMILTON

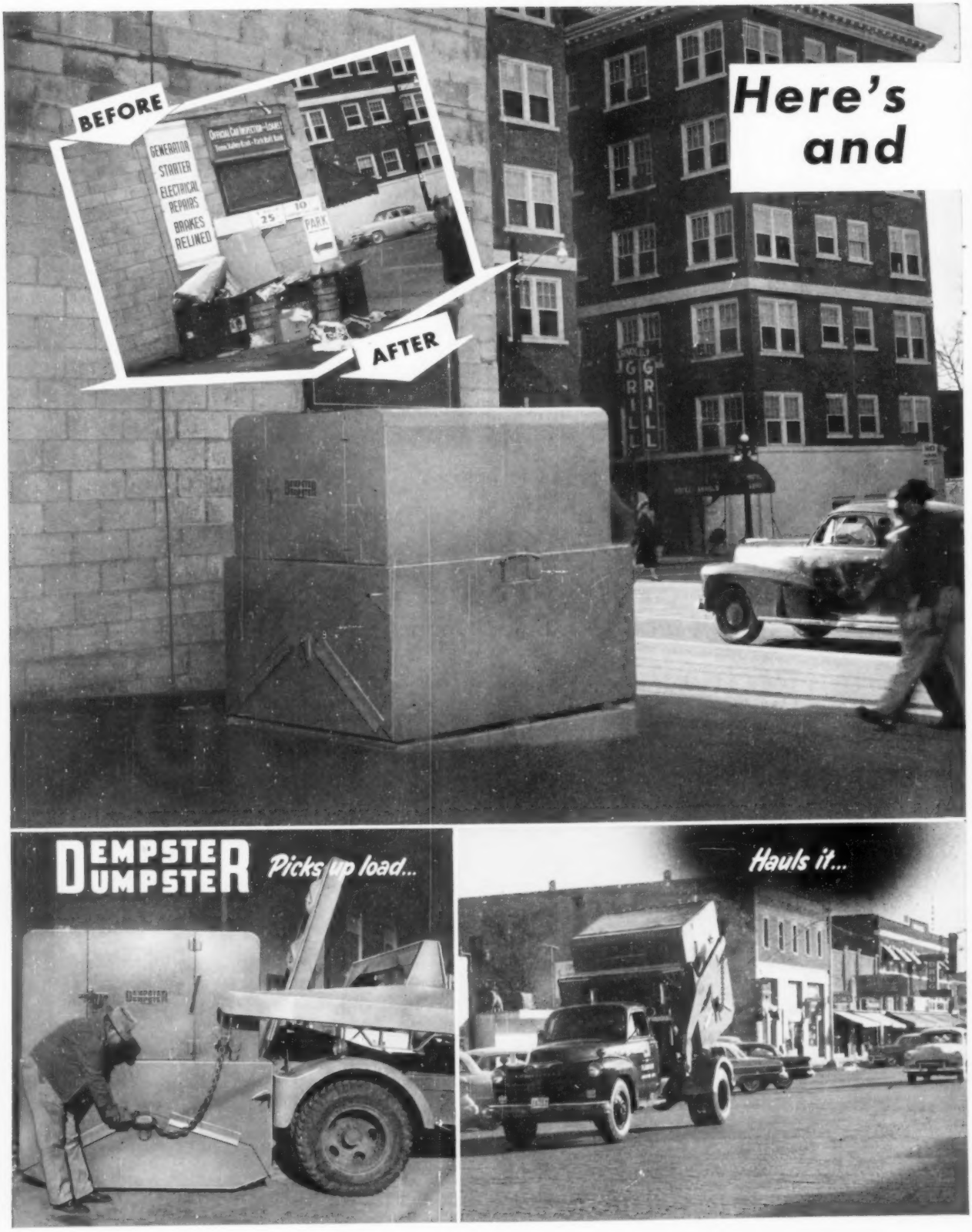
AUSTIN-WESTERN WORKS

BALDWIN-LIMA-HAMILTON

Construction Equipment Division

OTHER DIVISIONS: Eddystone • Lima • Electronics & Instrumentation • Hamilton • Loewy-Hydropress • Standard Steel Works • Madsen • Pelton

AURORA, ILLINOIS, U.S.A.



5204

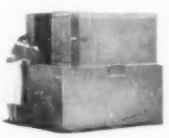
DEMPSTER

VISIT US BOOTHS A-33—A-34 APWA SHOW, SEPT 23-26, FORT WORTH, TEXAS

the solution to unsanitary costly bulk refuse collection...

... a simple, economical and nationally recognized solution to the problem of open cans, crates, etc, with overflowing loose refuse - - a costly potential in disease and fire hazards alone in damage to persons and property!

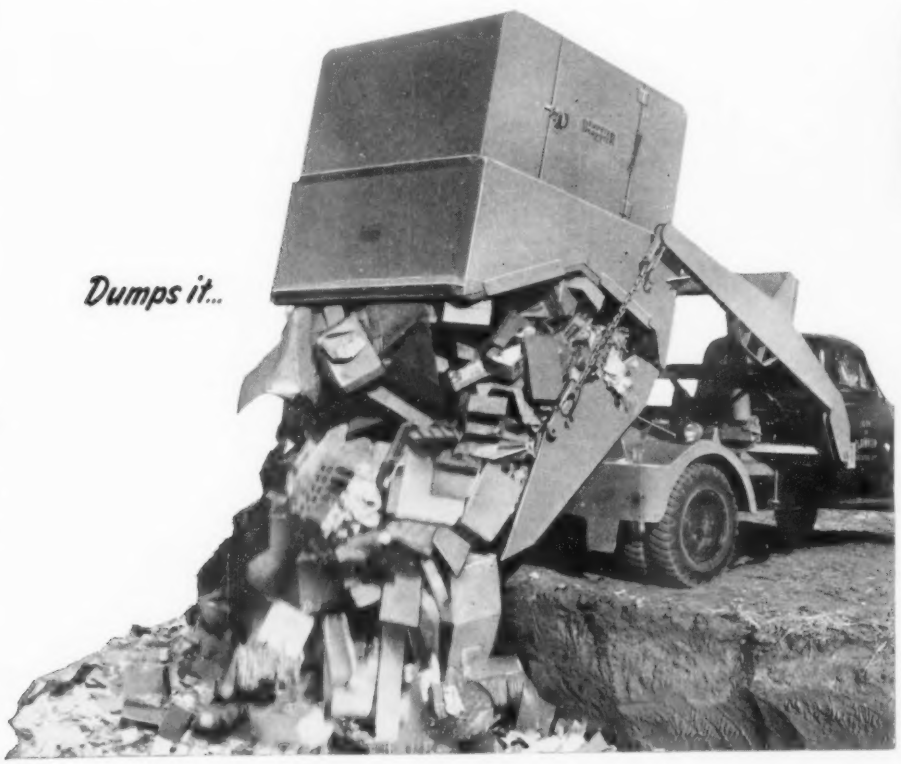
BIG STEEL DEMPSTER-DUMPSTER CONTAINERS—each equivalent to 75 ordinary trash cans—can be located at convenient bulk refuse accumulation points in your business areas . . . in housing and apartment areas . . . at schools, hospitals, etc. Scores of them—25, 30, 40, 50—served on pre-arranged schedule by only one man, the driver of your truck-mounted Dempster-Dumpster.



Invariably, wherever this system is installed, one finds immediate praise of an outstanding improvement from merchant users and citizens alike. Without question, the Dempster-Dumpster System is recognized as the most sanitary and lowest cost method of bulk refuse collection ever devised.

Without obligation on your part, our engineers will be glad to make a comprehensive fact-finding survey to determine the savings you can expect by the use of this amazing system. For instance, a year ago the system was installed at Borger, Texas "and has proven to be the answer to our trash and garbage problems in the business districts", writes City Manager Fritz Thompson. Now, it is being enlarged and Mr. Thompson confirms what our original survey pointed out that the Dempster-Dumpster equipment is being amortized out of labor savings alone in approximately four years. In nearby Plainview for another example, Mayor C. L. Abernethy tells us "We have found, as your original survey pointed out, that the labor savings alone will amortize the cost of the Dempster-Dumpster System within the first three years of its operation." Plainview has one Dempster-Dumpster serving 58 containers. Write us today! Dempster Brothers, Inc.

Dumps it...

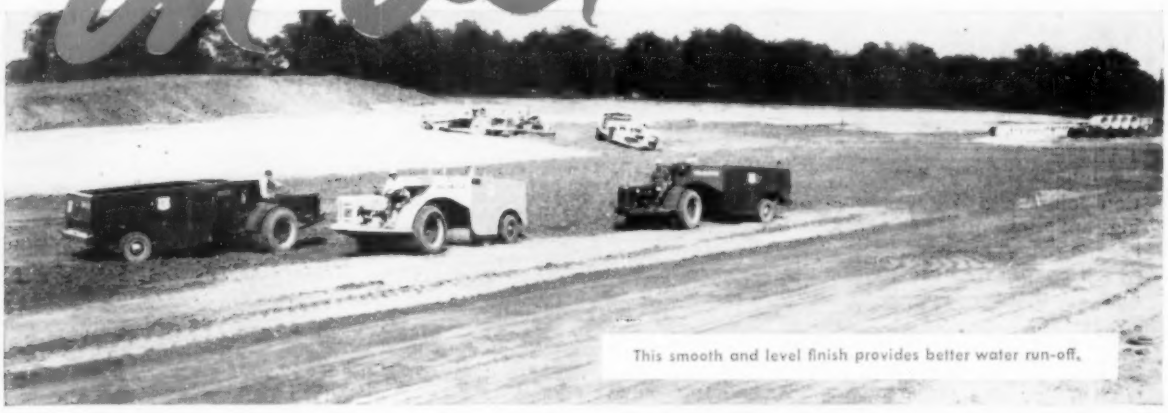


HERE ARE A FEW OF THE SCORES OF CITIES, LARGE AND SMALL, USING THE DEMPSTER DUMPSTER® SYSTEM

Atlanta
Baltimore
Davenport, Iowa
Henderson, Ky.
Jackson, Tenn.
Lakeland, Fla.
Lubbock, Texas
Pampa, Texas
Wilmington, N. C.
Richmond, Va.
Rochester
New York City
Denver
Montgomery, Ala.
Odessa, Texas
Wyandotte, Michigan

BROTHERS 996 Dempster Bldg., Knoxville 17, Tenn.

DUO-PACTION in action



This smooth and level finish provides better water run-off.

...at the MAYFAIR SHOPPING CENTER PROJECT with the...

DUO-PACTOR

Kramp Construction Co., Milwaukee, is making grading history on the mammoth Mayfair Shopping Center Project (one of the world's largest), on the outskirts of Greater Milwaukee.

- The job calls for grading and compacting approximately 100 acres of rough terrain, moving 800,000 cu. yds.
- Three Seaman-Gunnison Duo-Pactors are used to compact 16,000 cu. yds. per day.
- Duo-Pactor combination rolling provides greater densities in much less rolling time than heavier equipment.
- The smooth, level finish of Duo-Paction provides better water run-off and less downtime after heavy rains.
- Duo-Pactor maneuverability permits fast turns, and getting in and out of tight corners quickly — fits into small jobs as well as large projects.
- The Duo-Pactors provide complete coverage in record time, smoother surfaces, higher densities, better finishing, at less cost.

Large diameter drive roll tires provide better traction.

See Duo-Paction in Action and see how this advanced method of Soil Consolidation can save you time and money. Sold and serviced by leading construction equipment distributors throughout the world.

Write for literature and name of distributor covering your territory.

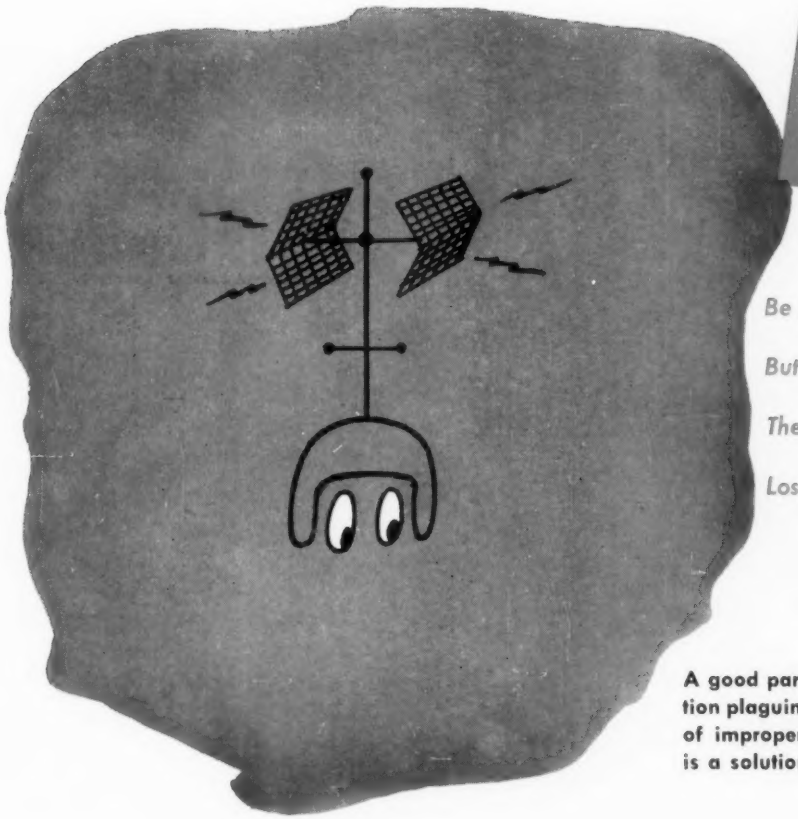
DUO-PACTOR features

Large diameter drive roll tires; 8-wheel trailing roll (spring-mounted in pairs for torsion control oscillation) with tires unequally spaced to prevent direct and duplicate tracking; separate or dual rolling with pneumatic and steel rolls; finger-tip hydraulic control; complete turn-around in 8-ft. radius; IH "300" Utility Tractor; weight range: 6 to 19 tons.

SEAMAN-GUNNISON Corporation

Milwaukee General Offices: 2763 South 27th Street, Milwaukee 15, Wis.

Manufacturers of the Duo-Pactor, Swing-Bar Distributors and Hydro-Jet Flushers



A short and not very technical History of Refuse Disposal

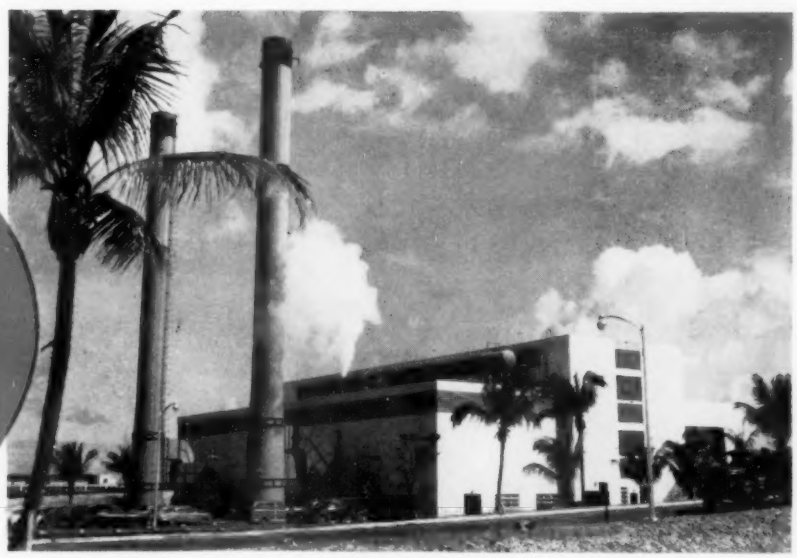
No. 3 of a series

Be it ever so humble,
there's no place like home,
But unless you're equipped
with a new radar dome,
There's always a chance
you'll die of starvation,
Lost in a smog, man's most
modern privation.

A good part of the smog and air pollution plaguing modern cities is the result of improper refuse incineration. There is a solution to this problem, however.

And, in 1956.....

more and more communities are taking advantage of the fact that compliance with the most stringent air-pollution control codes is possible with the Nichols Monohearth refuse incinerator, combined with the Nichols Wetscrub* Fly Ash and Dust Collection System. In addition, waste heat is converted to useful steam, as in the Miami, Fla., refuse incineration plant, shown at right, Nichols Monohearth and Wetscrub equipped.



Consulting Engineers
Maurice H. Connell and Associates
Miami, Fla.

*Patent Applied For

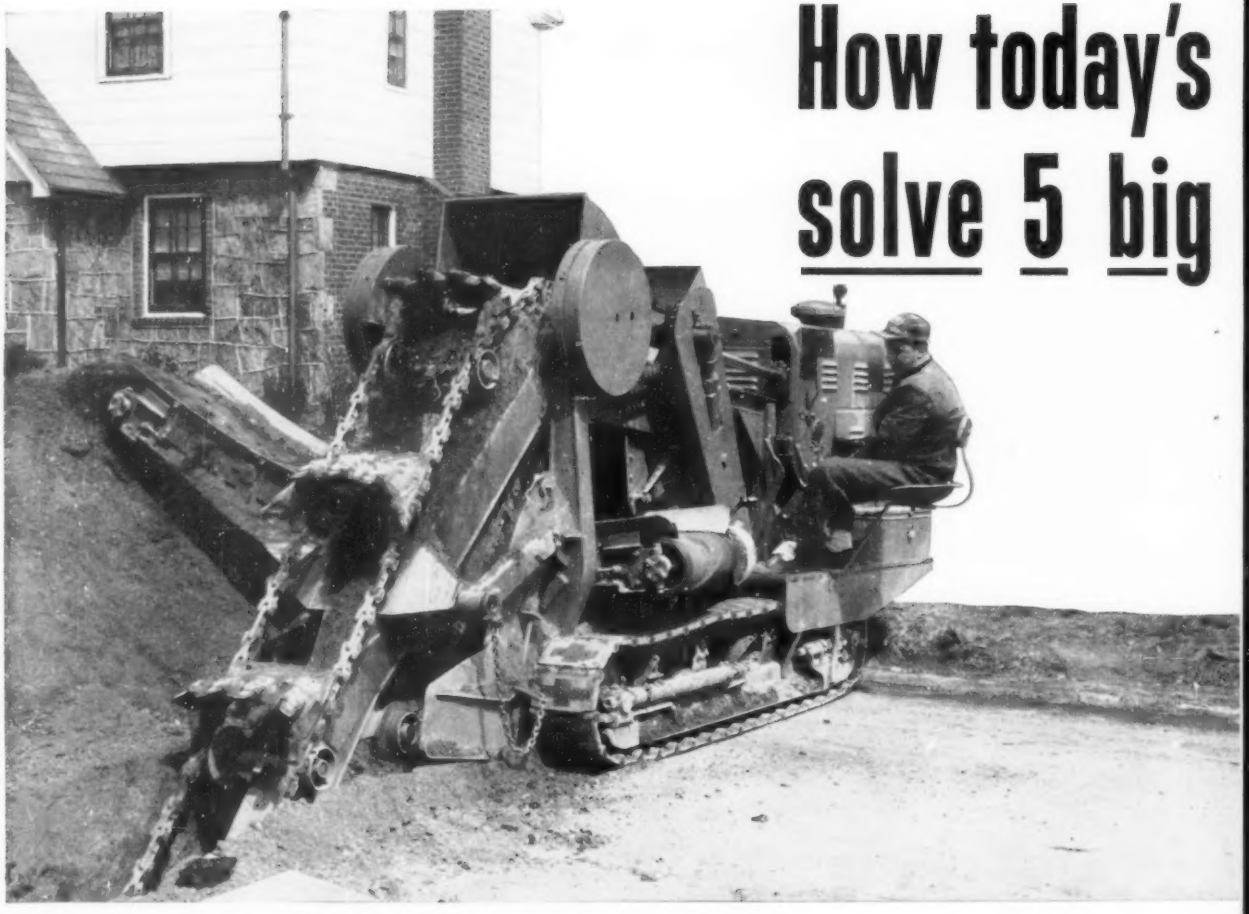
Nichols Monohearth

Mechanically Stoked Refuse Incinerators

NICHOLS ENGINEERING & RESEARCH CORP. · 70 Pine St. · New York 5 · N.Y.

1637 N. Illinois St., Indianapolis 2, Ind. 1477 Sherbrooke St. W., Montreal 25, Canada

How today's solve 5 big



PROBLEM: MORE SEWERS AND WATER MAINS

The boom in residential construction means new service lines for subdivisions. Many municipalities have the added problems of increasing the capacity of existing storm sewers, and installing sanitary sewers in older neighborhoods. The Gar Wood-Buckeye 407 ditcher was designed for "stop and go" utility work like this. Streamlined and compact, this ladder-type ditcher works best in close quarters. To clear obstructions, you push a button . . . the conveyor shifts while *you keep digging*. The 407 digs right up to walls and foundations . . . has an exceptionally low ground bearing pressure to protect lawns and sidewalks.

PROBLEM: MORE REFUSE TO COLLECT

The problem of refuse collection increases with population growth. Only Gar Wood offers a complete line of modern equipment to meet your growing collection needs. You can choose from six Load-Packer models . . . two new continuous-loading Speed-Packer models. And, you can also convert your present Load-Packers into continuous loaders with the new Speed-Packer Tailgate. All are built and backed by Gar Wood, the originators of packing-type collection equipment. All are designed to provide greater sanitation and better service with lower maintenance costs.

PROBLEM: MORE LIFTING AND HAULING

Your present trucks will handle a greater variety and volume of work if they're equipped with Gar Wood truck-mounted cranes. You'll save time and labor handling cast iron, steel and concrete pipe . . . curb stones . . . street lighting poles . . . transformers . . . trees . . . fire hydrants. Gar Wood cranes require a minimum amount of space behind the cab . . . permit maximum payloads . . . do not interfere with regular use of truck body when crane is idle. Available in a complete range of sizes and types, with capacities from 1½ to over 8 tons.

Gar Wood equipment can help you problems of municipal growth

Unless your municipality is a rare exception, it's suffering today from growing pains! For never before has there been such a tremendous increase in urban and suburban population . . . in traffic on your city streets . . . in new homes and subdivisions. In the long run, this growth can be healthy—a valuable stimulant to the economy of your community. But right now it puts a strain on every phase of municipal government.

An increasing municipal population means more sewer, gas and water lines . . . more residential and commercial refuse to collect . . . more street maintenance . . . more service connections for utilities . . . more of virtually every service your city provides.

The solution to these problems is complex, but an important part of it is a sound analysis of the work to be done, followed by a careful selection of equipment that can handle it most efficiently and economically.

The people in your community who distribute Gar Wood truck equipment and construction machinery are well-qualified to help you with both jobs. They know your municipality . . . they're experienced in job applications . . . they handle the most advanced line of equipment available today. Talk with them now . . . you'll find them anxious to help you solve the problems of municipal growth!

GAR WOOD INDUSTRIES, INC.

Wayne, Michigan

Plants in Wayne and Ypsilanti, Mich.; Findlay, Ohio; Mattoon, Ill.; Richmond, Calif.

PROBLEM: MORE EXCAVATING AND LOADING

Expanding municipalities use Gar Wood "75" excavators to handle a wide range of excavating and material handling jobs faster, and for less. Gar Wood's independent chain crowd mechanism makes it easy to convert the "75" for use as a trench hoe, shovel, dragline, clamshell, crane or foundation borer. Available on self-cleaning tracks or as a 20-ton truck crane that moves quickly and easily from job to job. Gar Wood "75" excavators are built and backed by specialists in ¾ yard machines . . . your assurance of top performance, lower maintenance costs.

PROBLEM: MORE STREET MAINTENANCE

Population growth means traffic growth, and a street maintenance problem comes with it. Gar Wood-St. Paul dump bodies and hoists can help you handle this increased volume of maintenance work at a lower net cost per payload hour. These dump bodies are stress-tested to put strength where it's needed, eliminating excess weight. Strong-Arm hoists are designed for greater stability and faster, safer dumping. You'll also find that Gar Wood-Buckeye Surface Material Spreaders can substantially reduce your costs of spreading sand, gravel, salt and ashes.

Trickling Filters

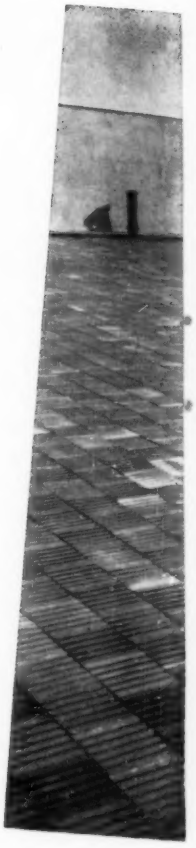
at

FORT WORTH, TEXAS

use

TFFI

UNDERDRAINS



In Fort Worth rapid growth of the city produces fresh problems in sewerage and wastes treatment almost daily. To anticipate them and be prepared to meet them trickling filters were chosen as the best possible combination of efficiency and flexibility.

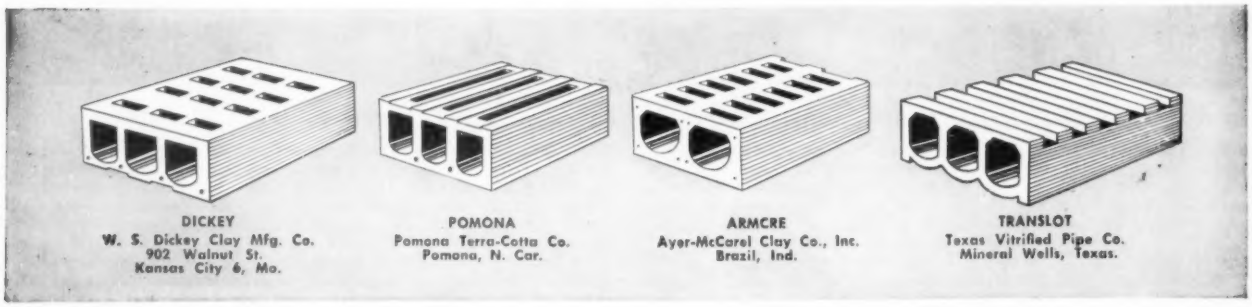
because

Advantages of flexibility include the fact that the essentials are the same for low rate or high rate filters, for large volume or small. A basic, properly designed trickling plant such as Fort Worth's is capable of meeting all requirements—present and future—within foreseeable limits. Plus these other desirable features: ability to handle overloads, expansion, simplicity and reliability of operation, long life, low costs, durability and good results.

TFFI SPECIFICATIONS

For underdrains are contained in pages 37 and 38 of the new TRICKLING FILTER HANDBOOK, under "Standard Specifications for Vitrified Clay Filter Blocks for Trickling Filters." Available from any TFFI member.

TRICKLING FILTER



DICKEY
W. S. Dickey Clay Mfg. Co.
902 Walnut St.
Kansas City 6, Mo.

POMONA
Pomona Terra-Cotta Co.
Pomona, N. Car.

ARMCRE
Ayer-McCarel Clay Co., Inc.
Brazil, Ind.

TRANSLOT
Texas Vitrified Pipe Co.
Mineral Wells, Texas.

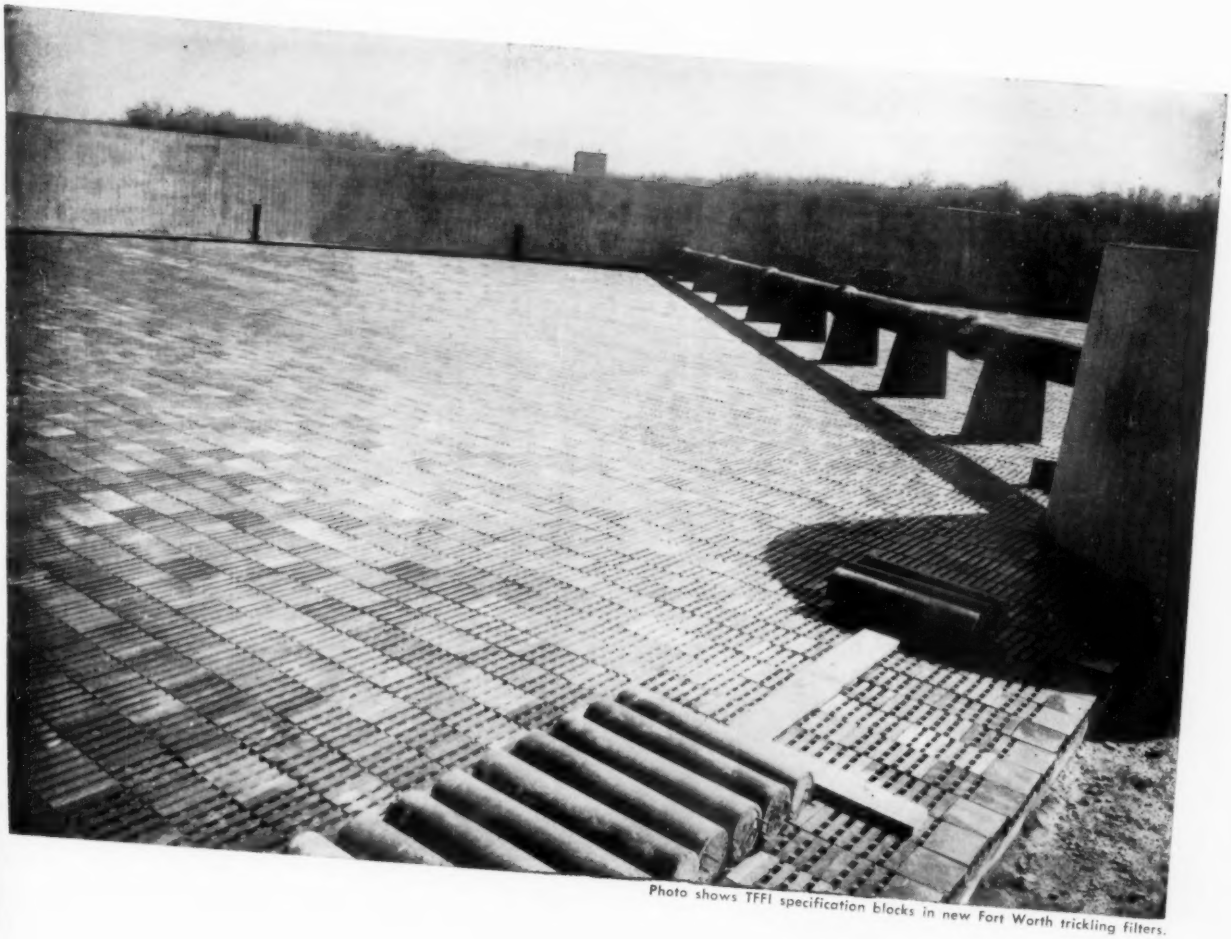


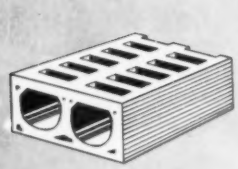
Photo shows TFFI specification blocks in new Fort Worth trickling filters.

Designed by Freese and Nichols, Consulting Engineers, Fort Worth, Texas.

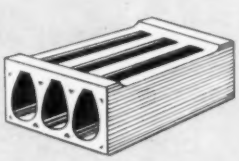
Equipment by Infilco Incorporated, eight 200-ft. rotary distributors; Process Engineers, Incorporated, three 95-ft. secondary clarifiers; Pacific Flush Tank Company, two 75-ft. floating sludge digester covers; Jeffrey Manufacturing Company, bar screen.

Construction by Russ Mitchell Incorporated and Bruce Construction Company of Houston and Fort Worth, Texas.

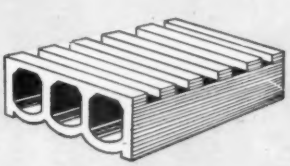
FLOOR INSTITUTE



BOSCO
Bowerston Shale Co.
Bowerston, Ohio



NATCO
Natco Corporation
327 Fifth Ave.
Pittsburgh 22, Pa.

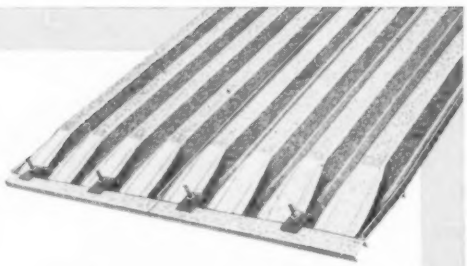


TRANSLOT
Cannelton Sewer Pipe Co.
Cannelton, Ind.

TFFI

Symbol of
good treatment

A NEW



USF

PRODUCT... *Leave-In-Place*

STEEL FORMS

FOR CONCRETE BRIDGE FLOORS

Bridge on U.S. Route 13 over Pennsylvania R.R. Tracks near Morrisville, Bucks County, Penna.

Investigate this new USF Leave-In-Place steel form for concrete bridge floors. Made of galvanized steel, trapezoidally corrugated in laying widths approximating 24″ for clamping direct to structural flanges, it particularly adapts itself to structures involving high or hazardous conditions. Permits all form work from top-side and eliminates shoring and stripping of old-fashioned wood forms. Once in, you leave-in-place. Low cost—to be sure!

- **Erect fast—Leave-In-Place**
- **Eliminate shoring and removal expenses**
- **No warping, cracking, shrinking, or swelling**
- **Save manhours and material waste**
- **Speed-up schedules—save dollars and penalties**

Write for data sheet now

USF

UNITED STEEL FABRICATORS, INC.

WOOSTER, OHIO

USS STEEL

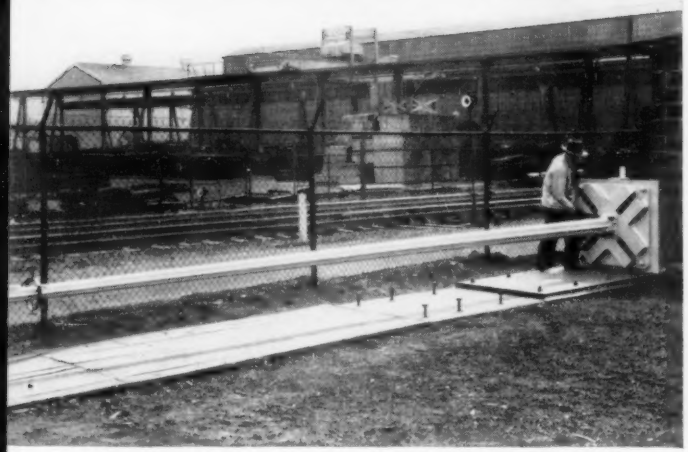
PRODUCTS { Hollow Metal Doors • Prefabricated Metal Buildings • Window Wells
Highway Guard Rail • Bridge Flooring • Corrugated Metal Pipe
Sectional Plate Pipe and Pipe Arches

Albert G. Wyler is Director of Streets for the City of New Orleans, La. Graduating from Tulane University in 1925 with a degree in Civil Engineering, he began work with the City in 1926. In 1948, he became City Engineer, which post he held until 1954 when the City Engineer's title was changed under the City charter then adopted to Director of Streets. His duties include engineering, designing, constructing and marking all city streets, bridges and related structures and approaches; maintenance and repair of all streets.

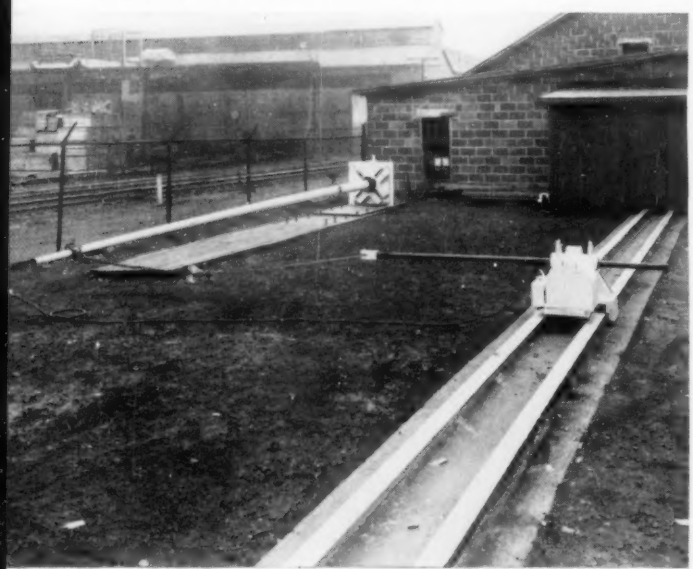
The picture on the front cover shows the improvement program being carried out on Melpomene Ave., from St. Charles St. to Camp St. The canal shown was constructed in 1885 of brick, as a part of the New Orleans drainage system. This improvement was necessitated by the construction of the new bridge over the Mississippi River. The street has had two 15-ft. roadways with a median strip of 21 ft., under which the canal is located. When the improvement has been completed, there will be a 20-ft. and a 28-ft. roadway with a 3-ft. median strip.

Mr. Wyler is Vice-President of the Southern Area for the American Public Works Association and past President of the New Orleans Chapter; chief of the Public Works Section of the New Orleans Civil Defense organization; a member of the Louisiana Institute of Municipal Engineers; past president of the Municipal Engineers' Ass'n. of Louisiana; a member of the ARBA; and a registered civil engineer.

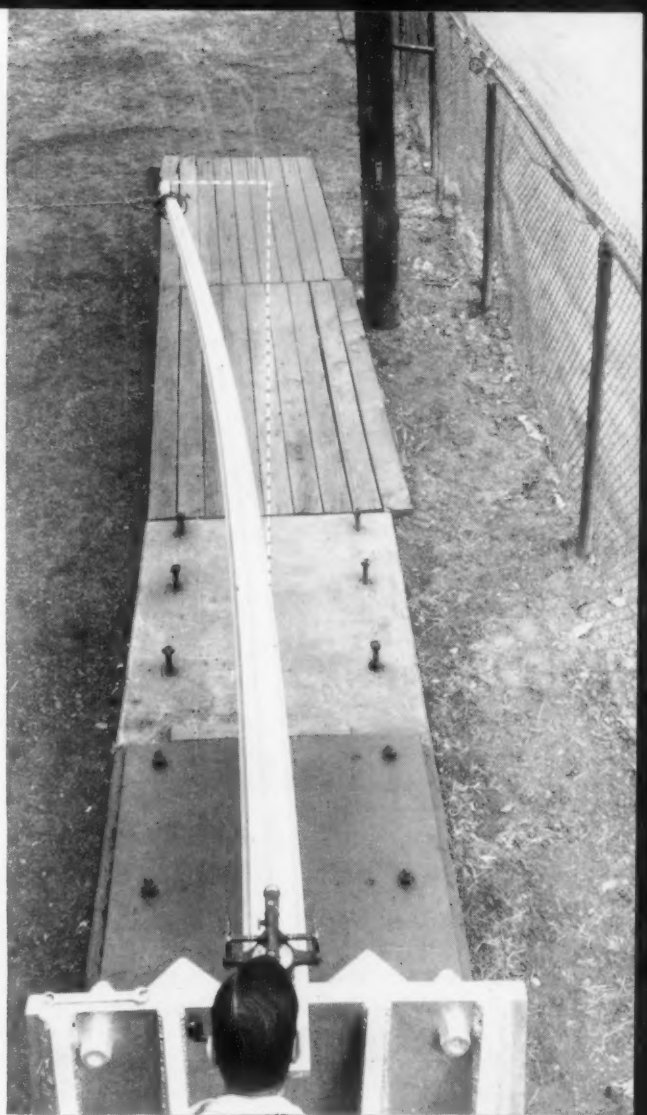
His hobby, he says, is gardening, with a side line of collecting odd-shaped pipes. He and Mrs. Wyler are the parents of twin daughters and six times grandparents.



Bolting anchor base type Monotube pole to test block. Testing engine assembly will be attached to target ring at left of photo. This apparatus can withstand loads up to 500,000 foot pounds.



Monotube poles are tested in a horizontal position for better observation, closer load control and more accurate deflection measurement. Testing engine (on track) is attached to pole at point where measurement is desired.



Engineer at near end of fluted Monotube pole measures distance of deflection with transit as indicated by the line of sight. This line represents the permanent vertical reference line established by the locked transit.

MONOTUBE LIGHTING POLES . . . PROVED BY TEST.

Continuous testing and research by Union Metal engineers goes a long way towards making Monotube poles *your best buy.*

For example, here's one type of test: The pole is bolted to a heavy plate anchored to a concrete foundation and test load is applied. Load and deflections are read accurately with dynamometer and transit. Loads as high as 10,000 pounds can be applied.

This *proved* ability to withstand excessive stresses and strains, under all loads and weather conditions, is just one of many Monotube plus advantages. Monotube poles, available in a range of sizes and designs, offer attractive appearance, easy installation and complete conformance with recommended lighting practices.

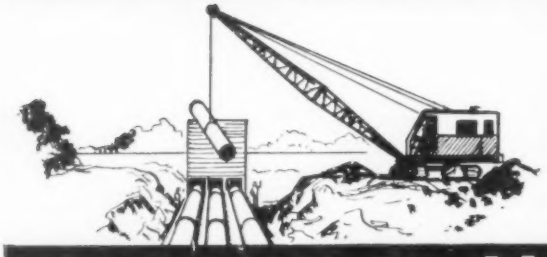
To learn more about Monotube poles for *every* outdoor lighting need, write The Union Metal Manufacturing Company, Canton 5, Ohio.

1906 *Fiftieth Anniversary* 1956

UNION METAL

Monotube Lighting Poles

How Oklahoma City Solved a Sewer Relocation Problem –



AMERICAN Double-X Mechanical Joint Pipe

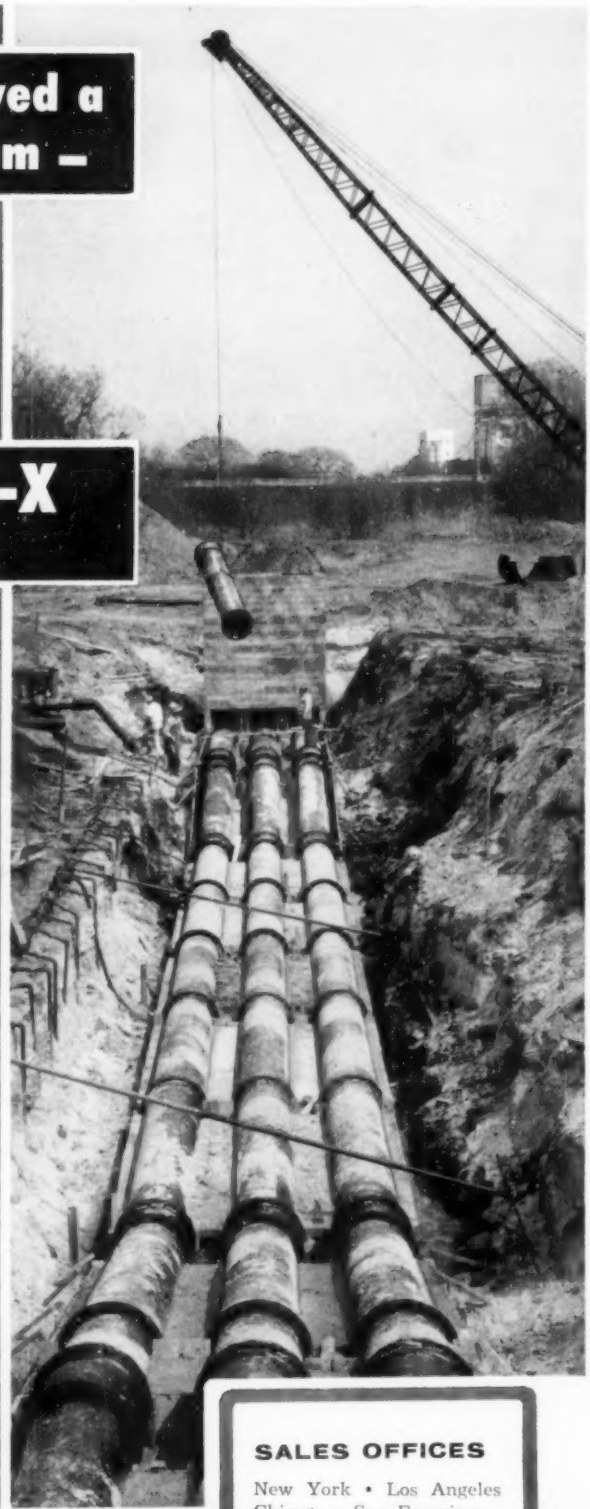
When the channel of the North Canadian River at Oklahoma City had to be relocated, Oklahoma City faced a sewage disposal problem. The sixty-inch gravity sewer across the river bottom obstructed the path of the new channel.

Engineering studies indicated that the installation of two inverted siphons with gravity flow was the most practical way to relocate the sewer.

Alert municipal officials in Oklahoma City planned for the future when these siphons were installed. With an anticipated future flow almost four times as great as the present maximum flow, three 30″ American Double-X Mechanical Joint pipe lines were laid for one siphon, and three 24″ Double-X lines for the second.

In addition to planning for adequate capacity, these officials planned for longer and more economical service. Corrosion-resistant, longer lasting cast iron pipe was their choice . . . *quality* pipe, centrifugally cast by the American Cast Iron Pipe Company.

If your project is important now, and will be even more important in the future, be sure you specify American Cast Iron Pipe.



SALES OFFICES

New York • Los Angeles
Chicago • San Francisco
Kansas City • Orlando
Minneapolis • Pittsburgh
Dallas • Cleveland
Houston • Denver

AMERICAN CAST IRON PIPE CO.
BIRMINGHAM 2, ALABAMA

3 more counties get tax-saving performance from International-Powered motor graders

Two Model 104 Galion Motor Graders owned by New Jersey County, rely on International UD-14A diesel power to blade material in mix-in-place road surfacing.

Another progressive county in Texas maintains one of its county roads with Austin-Western 99H power grader. Unit is International powered with a UD-14A for economy, long life.

Two Model 118 Galion Motor Graders, both equipped with International UD-525 diesel engines, maintain road for cost-conscious county in Georgia.

Here are three more counties who have proven the long life, dependability, and tax-saving performance of International-powered motor graders. Since the development of these versatile and practical earthmoving machines, progressive counties like the three pictured here have used thousands of International-powered motor graders. It's proof that International power units give highway and street departments the economical kind of power they need and want.

Some of the many reasons for this in IH diesels are: exclusive injection and combustion systems for clear exhaust, full measure of power...over 15 to 1 compression ratio for full working expansion of hot gasses behind the pistons, better fuel economy...heavy, counter-balanced crankshaft or vibration-dampeners for smooth operation (new gear-driven balancers on UD-350 and UD-14A)... and exclusive IH in-built gasoline conversion starting system which turns the engine 3 times faster than ordinary systems for fast, easy diesel starts in any weather.

It follows, that if so many cities, counties, and states choose International engines for new equipment...they must be good for replacement, too. See the complete line of International diesel and carbureted engines at your International Power Unit Distributor or Dealer, soon.

CHOOSE FROM 17 HEAVY-DUTY INTERNATIONAL DIESEL AND CARBURETED ENGINES—FROM 17 TO 214 HP.

See you at the **ROAD SHOW CHICAGO** Jan. 28-Feb. 2, 1957

INTERNATIONAL® CONSTRUCTION EQUIPMENT

International Harvester Company
180 North Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors... Self-Propelled Scrapers and Bottom-Dumps... Tractors and Rubber-Tired Loaders... Off-Highway Trucks... Diesel and Carbureted Engines... Motor Trucks.

HERE'S THE WHITE PUBLIC WORKS Show-In-Print

FOR MAXIMUM EQUIPMENT UTILIZATION... MODERNIZE WITH THE WHITE 3000

LOOK at what's new in public works equipment and—every time—you'll be sure of the greatest efficiency if you go WHITE 3000!

That's the report from municipalities across the country. That's the word at this year's Public Works Congress in Fort Worth.

The WHITE 3000 is engineered to exact operating conditions and specifications for all applications shown—and many more!

Why not discuss your equipment program with your White Representative? You'll get latest transportation equipment information... most practical, efficient application... the best in performance and service for your public services... for years to come.

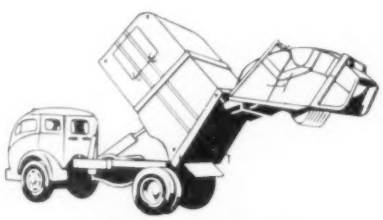
THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

FIRST—IN THE FIELD

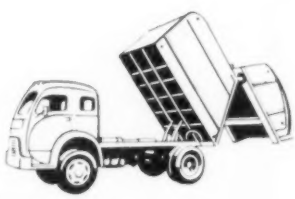
White 3000

PROVED IN BILLIONS OF LOW-COST MILES

FOR MORE THAN 55 YEARS
THE GREATEST NAME IN TRUCKS



LEACH PACKMASTER



HEIL COLECTOMATIC

IDEAL TRUCK FOR ALL THESE OTHER

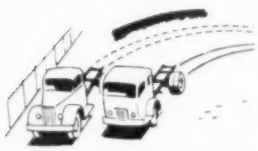
RUBBISH COLLECTION

AERIAL UNIT

STAKE—WINCH

LINE UNIT

MODERN, FUNCTIONAL ADVANTAGES OF THE WHITE 3000 MAKE IT TOMORROW'S TRUCK TODAY . . . *in public service!*



Unmatched maneuverability!

Wider tread front axle, shorter turning radius and short wheelbase save maneuvering time in congested streets and alleys . . . cut traffic time. That means longer routes serviced—more work done!

Roomy cab saves time and steps!

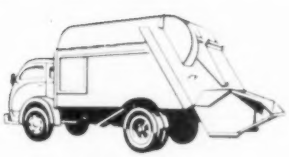
Easy in . . . easy out . . . either side! No doghouses. Plenty of space for three. Low-level cab saves steps and time . . . gets more work done in less time. Functional design adds to life of truck.

Ideal visibility —maximum safety!

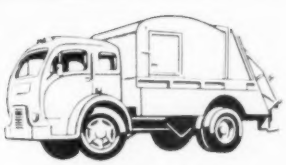
Driving ease—especially in traffic and congestion—reduces bumps and accidents. Excellent visibility! In every way its design means greater safety every hour of the day.

White quality, too, in every feature!

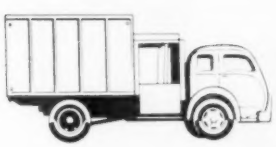
The exclusive power-lift cab is typical of White Quality and modern design . . . in every feature. It's engineered for dependable performance, year after year!



ROTO-PAC



GAR WOOD LOAD-PACKER



HYDEPAK

PUBLIC SERVICE APPLICATIONS . . .

STREET FLUSHER

STREET REPAIR

SNOW PLOW—DUMP

GARAGE TOW TRUCK

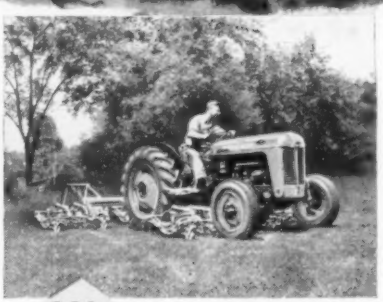
GREAT NEW IDEA in

52 hp

WORK BULL Model 404 with $\frac{5}{8}$-yd, low-pivoted loader. Like all WORK BULLS, 404 has specially designed industrial front axle and heavy-duty clutch. (Diesel engine is optional.)

42 hp

WORK BULL Model 303 handles materials with either utility boom or fork lift . . . also mounts blade, loader, hoe, broom, mowers, snow plows and other attachments.



34 hp

WORK BULL Model 202 with reel-type mower to maintain grounds. WORK BULL attachments can be switched in 5 to 15 minutes — without special gear.

42 hp

Davis PIT BULL with 24" hoe features torque converter, reversing clutches and 5 speeds forward, 5 reverse. In many cases it outworks, outperforms high-priced, single-purpose rigs.

tractors and attachments—

M-H-F

WORK BULLS

NOW — from one source — a package of 5 versatile, low-cost tractors with 20 power-matched, easily-interchangeable attachments!

Contractors! Industries! Utilities! Profit from this new idea in greater machine utility and efficiency. Get the benefits of low cost attachment interchangeability . . . the high-profit performance of tools matched to power and speed . . . the adaptability of job-matched equipment to replace or supplement high-priced, single-purpose units.

What's more, you enjoy the advantages of a single sales and service source — a complete package — available only in the low-cost WORK BULL line.

New, and built to excel where other wheel tractors fail, WORK BULLS pay off in a wide variety of applications . . .

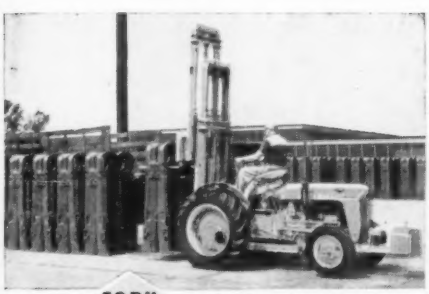
As primary equipment, WORK BULLS put former hand work on a power basis . . . efficiently handle scattered, work-and-run assignments.

As backup machines, WORK BULLS team with medium-priced, single-purpose equipment . . . give you the power equipment ratio that exactly fits the job.

As utility or cleanup tools, WORK BULLS are perfect for hustling around big layouts and relieving big equipment of unprofitable odd-job duties.

Get the complete WORK BULL story now. Write for 24-page illustrated catalog.

IMPORTANT NOTE TO RETAIL DISTRIBUTORS — WORK BULL franchises are still available in a few key areas. Write or wire for details.



FORK LIFT

Fork Lift Model 202 has lifting capacity of 1500 lbs at full height, 4000 lbs at half height. Optional mast gives lift heights to 21 ft. Works on or off hard surface.

Look at this wide choice of integrated WORK BULL attachments!

LOADERS—9 or 11 cu. ft.; ⅝-yd. or ⅞-yd.

BACKHOES—12, 16, 20, 24 or 36" buckets

MOWERS—Reel, rotary or side-mounted

FORK LIFTS — 2000 and 4000 lb. capacities

BLADES—Bull dozer, angle dozer or grader

BROOM OR SWEEPERS

POST HOLE DIGGERS

ROTARY TRENCHERS

PIPE AND CABLE LAYERS

SNOW PLOWS

UTILITY BOOMS

SCARIFIERS

HAULING HITCHES

M·H·F WORK BULLS

Division of Massey-Harris-Ferguson, Inc.

16-I Quality Avenue **Racine, Wisconsin**

The Whole Construction Story wrapped up in one Gigantic Package!

A.R.B.A. ROAD SHOW and CONVENTION

International Amphitheatre—Chicago

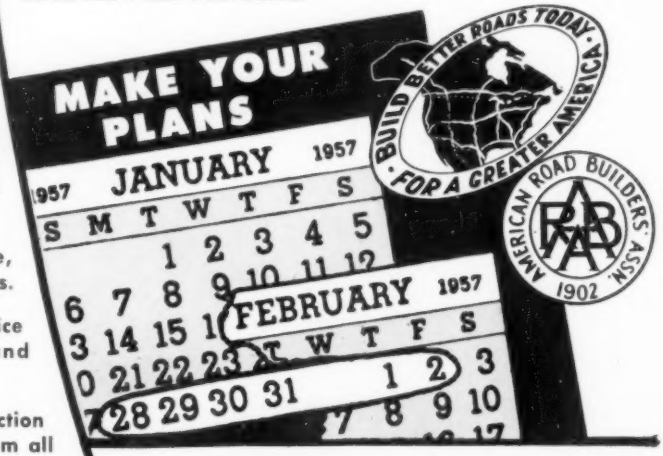
Almost 10 years since the last Road Show has seen vast changes —changing personnel in your organization—new people and expansion. Field operations cannot possibly permit the fullest study or comparison of equipment and the press of business reduces the opportunity for learning all there is to know of new methods.

The A. R. B. A. Road Show and Convention will bring you the whole construction story wrapped up in one package. 300,000 sq. ft. of equipment—over 1,000 pieces of machinery—down-to-earth discussions by leading construction authorities—a 6-day opportunity to "catch up" on all that's new in construction.

The tremendous immediate future of the industry warrants your planning to be there. Write for data on reservations. Ask to be put on the list for future information on the 1957 A. R. B. A. Road Show and Convention.

The 10 Best Reasons Why You Should Not Miss The A.R.B.A. Road Show and Convention

1. First Road Show in nearly 10 years!
2. The best way to "catch-up" on latest advancements in equipment, materials and methods.
3. Helps you determine best buys in machinery through first-hand comparisons.
4. Gives you information you need to improve your operating efficiency.
5. Hear top-ranking specialists in all phases of highway, street and maintenance work.
6. Learn how latest Federal Government plans and regulations will affect YOU.
7. Meet leading Federal, State, County and Municipal authorities.
8. Discuss equipment and service needs with manufacturers and distributors.
9. Swap ideas with construction and maintenance experts from all over the world.
10. Renew old contacts . . . make new friends.

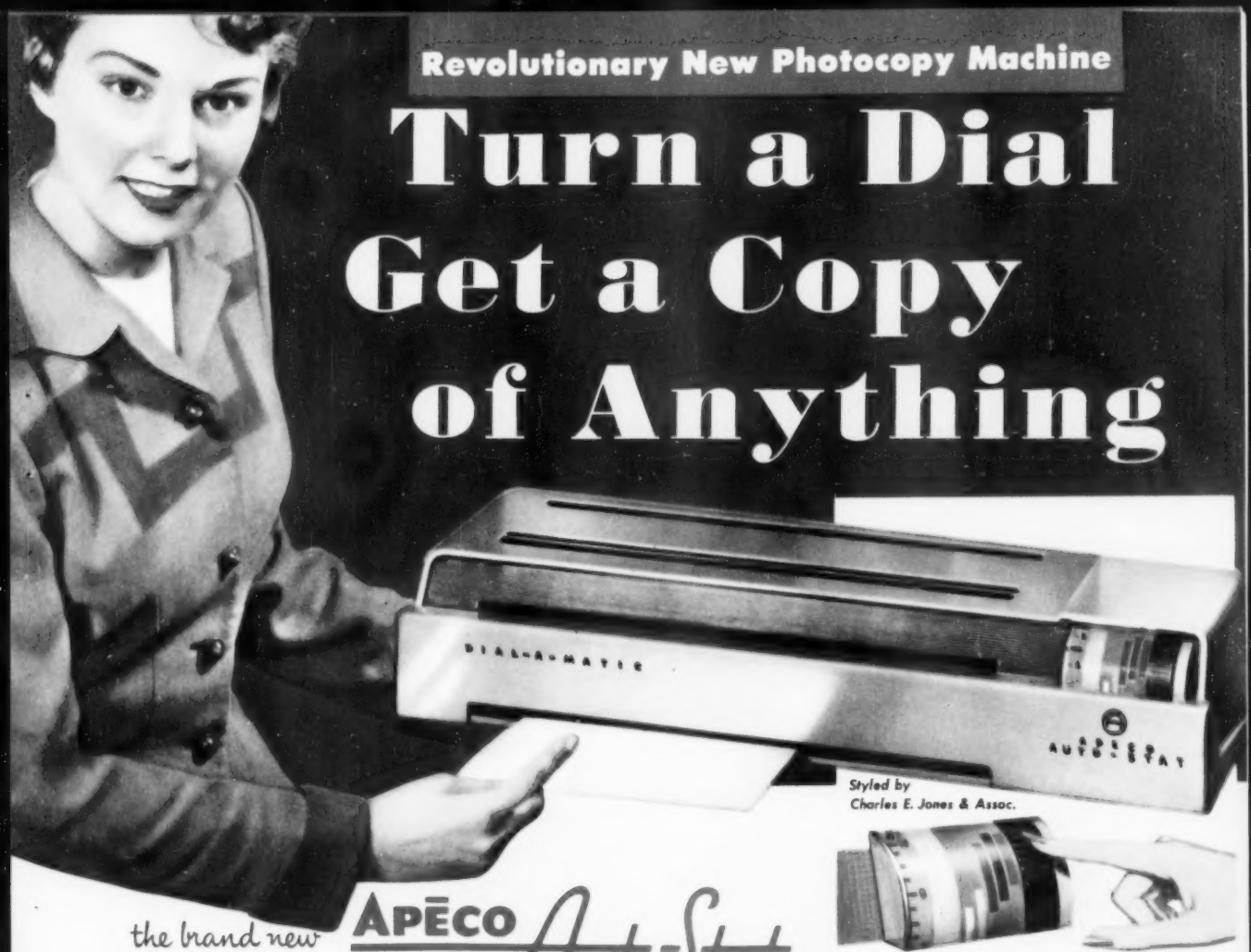


AMERICAN ROAD BUILDERS' ASSOCIATION

World Center Building Washington 6, D. C.

Revolutionary New Photocopy Machine

Turn a Dial Get a Copy of Anything



Styled by
Charles E. Jones & Assoc.

the brand new **APECO** DIAL-A-MATIC *Auto-Stat*

Now Get instant photocopies of anything written, printed, typed, drawn or photographed right in your own office.

Turn the dial . . . get the clearest, fastest most convenient copy of anything. It's the new all electric Apeco Dial-A-Matic Auto-Stat with revolutionary finger tip dial control. It's light weight for easy portability . . . compact to fit on the corner of any desk and is styled in polished and satin finish stainless steel. It copies any original up to 15″ wide, any length or color on opaque or transparent paper—printed on one or both sides. The Apeco Dial-A-Matic Auto-Stat offers hundreds of money and time saving uses at a price well within the budget of even the smallest firm.

The secret to the world's easiest copying method is in the dial. Amazing newly designed automatic copy control assures perfect copies every time. Just set the dial to the type of copies you want—your copies are ready in seconds.

Delivered with Lifetime Service Guarantee

Have You Read This NEW BOOK?

Mail This AIR MAIL

Postage Paid Card

For your *FREE* BOOK

(See other side)

AMERICAN PHOTOCOPY EQUIPMENT CO.
Chicago 26, Ill.

American Photocopy Equipment Co.
1920 W. Peterson Avenue (Dept. PWM-96)
Chicago 26, Ill.

Rush me, without obligation, your free booklet on new Apeco Dial-A-Matic Auto-Stat copying. I understand this factual report will show me how I can improve the efficiency of my business as well as increase work output.

PLEASE PRINT

Company_____

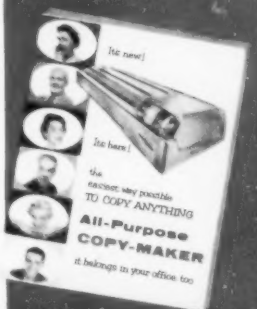
Address_____

City_____ Zone____ State_____

Individual_____

Title_____

In Canada: Apeco of Canada, Ltd.
134 Park Lawn Rd., Toronto, Ont.



THIS CARD TEARS OUT use it to get your *FREE* BOOK

New all-purpose copy maker

the brand new

APECO DIAL-A-MATIC Auto-Stat

The Improved **DIAL-A-MATIC** *for 1957*

USED AND APPROVED BY THOUSANDS OF ENGINEERS

COPY ANYTHING AUTOMATICALLY

New FREE book tells how...

Your free copy of this new booklet is packed with pictures and details about this revolutionary new copying method. Tells what Apeco Dial-A-Matic Auto-Stat copies are and how you can use these copies in your business. You, as well as every executive member of your staff, should read this worthwhile informative, factual report on this important new copy maker. You will find out how you can save time and money by speeding production, by cutting costly office paper work, by expediting shipping and receiving and hundreds of other ways to increase the efficiency of your business.

FIRST CLASS
Permit No. 26670
(Sec. 34.9 P.L.&R.)
Chicago 26, Ill.

Via Air Mail

BUSINESS REPLY CARD
No postage stamp necessary if mailed in the United States

5c—Postage will be paid by—

AMERICAN PHOTOCOPY EQUIPMENT CO.
1920 W. Peterson Ave.
Chicago 26, Ill.

Use this tear-out postage paid air mail card

MAIL CARD TODAY
for Free Booklet

The 544 loads snow at 7-11 cu. yd. per min. Or loads coal or leaves . . . or converts to the lowest-cost way to load aggregate from stockpile to truck. A 15 m.p.h. road speed and a hydraulic truck trimming conveyor boost speed and efficiency on any job.

Snow loaders that pay off all year 'round

Big snows are costly. Traffic gets jammed . . . fire trucks and police cars are blocked . . . business drops off. Time and money are lost.

But snow removal is costly. For most cities and towns it's too costly to maintain single-purpose snow removal equipment.

Barber-Greene multipurpose loaders solve this problem neatly and economically. As snow loaders, these machines have the high capacity and easy maneuverability to open up snowbound communities in a hurry. Between snow seasons, these versatile Barber-Greenes handle coal or easily convert to leaf and aggregate loaders to extend their efficiency to a year-round basis.

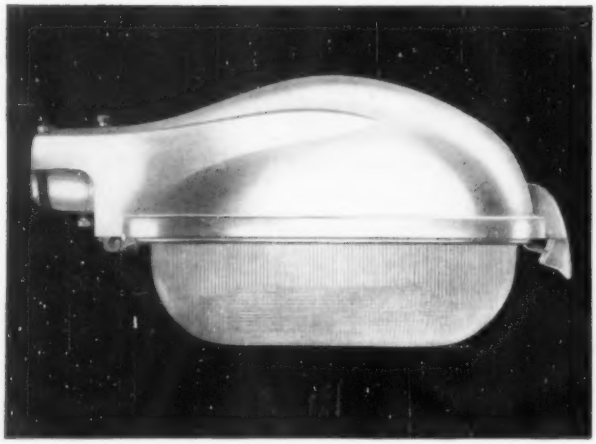
The 550 loads snow at 6 cu. yd. per min. As a windrow loader, its capacity is 4 cu. yd. per min., which keeps it ahead of all trucks normally available. Highly maneuverable, with a 10 m.p.h. road speed and a turning radius of only 8'6".

Write for details on these all-season loaders today. 56-24-L

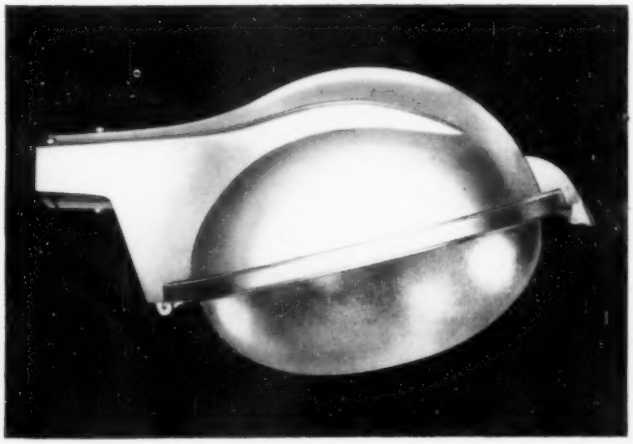
Barber-Greene

AURORA, ILLINOIS, U.S.A.

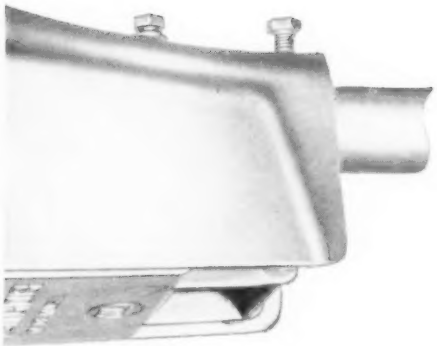
CONVEYORS . . . LOADERS . . . DITCHERS . . . ASPHALT PAVING EQUIPMENT



OV-20 uses 11,000-lumen CH-5, 15,000-lumen AH-1, 20,000-lumen EH-1, and 19,000-lumen JH-1 mercury lamps. Type II, III and IV distribution.



OV-60 uses 35,000-lumen AH-18, 33,000-lumen BH-18, 52,000-lumen AH-15, and 49,000-lumen BH-15 lamps. Type IV distribution.



New Westinghouse OV-35

. . . the first luminaire designed specifically for fluorescent mercury lamps

Westinghouse, pioneer in the development of mercury street lighting — the OV-20 and OV-60 — now presents the OV-35 luminaire which can be used with the 400-watt J-H1 or the 700-watt B-H18 fluorescent mercury lamps.

This third member of the Westinghouse mercury group now offers you a complete selection of mercury luminaires for any roadway application — regardless of width or traffic conditions.

The new OV-35 is the first street-lighting luminaire to include a completely sealed optical system — bugs, dirt or moisture cannot get in. Like the OV-20 and the OV-60, this new luminaire assures the best possible night visibility and a greater uniformity of pavement brightness. It inherits their same outstanding plus features, too . . . such as one-piece cast aluminum housing, new optical system, one-hand maintenance, and smooth good looks.

Whatever your roadway lighting requirements, be sure to specify Westinghouse mercury luminaires. More information? See your nearby Westinghouse representative. Or, write Westinghouse Electric Corporation, Lighting Division, Edgewater Park, Cleveland, Ohio. J-04405

WATCH WESTINGHOUSE!

COVER THE PRESIDENTIAL CAMPAIGN ON CBS TV AND RADIO!

FREE EQUIPMENT DATA to Help Your PUBLIC WORKS PROGRAM

The engineering information in these helpful catalogs will aid you in your Engineering and Public Works programs. Just circle numbers you want on the reply card, sign and mail. This free Readers' Service is restricted to those actively engaged in the public works field.

Distributed Steel For Concrete Pavement

509. A new 6-page bulletin, published by the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill., contains a discussion on the purpose of distributed steel in concrete pavement and presents a suggested method of designing to be used where distributed steel is needed in the pavement. Check the reply card for your copy.

Complete Line of Electric Power and Light Plants

510. Gasoline and diesel engine driven electric power and light plants are fully covered in literature available from Universal Motor Co., Oshkosh, Wisc. Engines, generators, electrical equipment, weights and dimensions are some of the sections included. Check the reply card.

Modern Water Storage in Elevated Steel Tanks

511. A new edition of a catalog on modern water storage in elevated steel tanks has been published by Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh 25, Pa. The 20-page bulletin includes dimensional data and capacities for six basic PDM tank types, in addition to many installation pictures and descriptions. Check the reply card today for your copy of this valuable catalog.

Modern Outdoor Lighting

512. A new two-color guide to modern outdoor lighting for shopping centers and commercial parking lots is now available from the General Electric Co., Schenectady 5, N. Y. The Bulletin, designated GEA-6438, defines basic lighting terms and describes applications of effective outdoor lighting. Check the reply card.

Literature on Power-Driven Shredders and Cutters

513. Specifications, advantages and applications of power-driven mowing equipment are fully covered in bulletins available from Servis Equipment Co., 1000 Singleton Blvd., Dallas, Texas. Stalk shredders, brush cutters and gyro-shredders are the equipment described. Check the reply card today.

Allis-Chalmers Advanced Design Crawler Tractor

514. A new 16-page, two-color catalog (MS-1100) has just been released covering design, engineering and operating highlights of the 75 hp AC HD-11 diesel powered crawler tractor. Check the reply card or write the Construction Machinery Div., Allis-Chalmers Mfg. Co., Milwaukee, Wisc., for the complete set of specifications.

Multi-Stage Flowmeter Catalog

516. A new illustrated catalog, No. 10 A-34, covering a new line of multi-stage, variable area Flowrator meters has just been published by Fischer & Porter Co., 778 Jacksonville Road, Hatboro, Pa. The instruments provide guaranteed indication within 0.5 percent of true flow rate over ranges of from 5 to 100,000 pounds per hour. Check the reply card.

Manual on Apparatus For Tests of Soils, Concrete and Asphalt Materials

518. The new 128-page catalog just released by Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill., contains descriptions and illustrations of over 1350 items of apparatus for engineering tests of soils, concrete, asphalt and construction materials. It lists items ranging from pocket penetrometers for soil, to pavement deflector instruments for asphalt, and 200,000 pound compression testing machines for concrete. Check the reply card today.

A Unit Providing Flocculation and Clarification in a Single Tank

505. Dorr-Oliver announces the availability of a new, 12-page, two-color bulletin, "The Dorrco Clariflocculator." It describes the physical characteristics, principle of operation, types, sizes and advantages of this combination flocculation and clarification mechanism. Check the reply card or write Dorr-Oliver Inc., Barry Place, Stamford, Conn.

What You Should Know About A New Waterstop

506. A new Polyvinylchloride waterstop for expansion and construction joints is described fully in Bulletin 101 available from W. R. Meadows Inc., 7 Kimball St., Elgin, Ill. Check the reply card for more information on this lightweight, durable and flexible waterstop.

Copy Anything the Easiest Way Possible

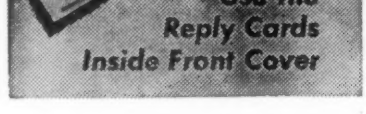
521. The new Dial-A-Matic copy making unit is described fully in literature available from American Photocopy Equipment Co., 1920 West Peterson, Chicago 26, Ill. The machine copies from any type of ordinary or specialized papers and card stocks—regardless of thickness or color — whether opaque, transparent, one or two sided. Photographs newsprint, blueprints, deeds and specifications are examples. For more information check the reply card.

Butterfly Valves For Water and Sewage Treatment Plants

507. Rubber seated butterfly valves are described and illustrated in a new two-color Bulletin No. 5603, available from F. B. Leopold Co., Inc., Pittsburgh, Pa. Complete details on the performance and construction features of the valve are included. Check the reply card.

Incinerators for the Disposal of Combustible Wastes

520. Bulletin 179 from the Morse Boulger Destructor Company, New York 17, N. Y., describes fully the basic principles of incineration as to combustion, auxiliary burners, draft and control and elimination of fly ash. Specifications and design of incinerators and hopper doors are included. Check the reply card for your copy.



Versatile Oliver Diesel Wheel Tractor

519. Powerful wheel tractor for construction and maintenance work is described fully in a catalog available from The Oliver Corp., 400 West Madison St., Chicago 6, Ill. Specifications, engine data and optional equipment are included. Check the reply card.

Trees and Shrubs For Landscape Planting

515. Evergreen seedlings and transplants, hardwood seedlings, azaleas, rhododendron and fruit and flowering trees are covered completely in literature available from Musser Forests, Inc., Indiana, Pa. For prices, description of trees and planting instructions check the reply card.

Design Data Manual For Gibbs Flotation Unit

508. A new technical and design data manual has just been released by F. S. Gibbs, Inc., 2300 Washington St., Newton Lower Falls 62, Mass. Flow diagrams, schematic and detailed drawings are included. Check the reply card.

Underground Pumping Stations, Complete Package Units

522. Pre-fabricated automatic underground pumping stations that are completely assembled for quick, economical installation are described fully in literature available from Schmieg Industries, Inc., Pumping Station Div., 23930 Sherwood, Center Line, Mich. Generous access space between pumps and accessible sump pump location are a few features.

A Modern Maintenance Tool For Compaction

523. Tampers that are the perfect answer to maintenance problems for street and highway departments, contractors, utilities and airports are covered fully in bulletin just released by Jay Mfg. Co., 168 Hosack St., Columbus, Ohio. For information on how to put patches in to stay, tamp where a roller can't and work in all kinds of weather, check the reply card.

Literature Available On Crawler or Truck Mounted Cranes

524. Cranes covering the 6 to 12 ton field, ½, ¾ and 1½-yd. capacities, for city, county and state highway departments, are fully described in literature available from Little Crane & Shovel, Inc., East Sixteenth and Howard Drive, Des Moines 13, Ia. Check the reply card for full information.

Spray Penetrating Oil That Gives Dynamite Action

525. Literature is available on a penetrating oil that is used to free the most corroded bolts, screws, pipe threads and any other stuck together metal parts. Its feather-touch assures penetration with pressure and shoots a stream three feet if needed. Check the reply card or write Rothlan Corp., 3618 La Clede Ave., St. Louis 8, Mo., for more information.

Snow Loaders That Pay Off All Year 'Round

526. Multipurpose loaders that have high capacity and easy maneuverability as snow loaders and as versatile loaders in the summer season to handle coal or easily convert to leaf and aggregate loaders are fully described in literature available from Barber-Greene, Aurora, Illinois. Check the reply card for capacity, loading rates and specifications.

In HATTIESBURG, MISSISSIPPI *

They make pipe joints

"LEAK-PROOF FOR LIFE"

with

TYLOX

RUBBER

GASKETS

Swamp country . . . ! That was the location of part of Hattiesburg's new sewers. In deciding on the coupling material, engineers knew ordinary pipe joints would be no match for the conditions. The joints would be subject to severe STRESS from shifting sand, SOAKING from wet soil and CORROSION from rotting organic matter . . .

TYLOX RUBBER GASKETS were specified . . . the only jointing material engineers felt could successfully combat *all* the conditions. TYLOX, they knew, would offset slow trench work with fast pipe coupling, assure leak-proof joints with a rubber-tight *compression* seal, and, being made of non-deteriorating rubber, would outlast the pipe itself.

* **PROJECT:** City of Hattiesburg, Miss., sewer expansion.

ENGINEERS: Winchell Web & Associates, Consulting Engineers, Jackson, Miss., and Robert L. Morrison, Consulting Engineer, Hattiesburg, Miss.

CONTRACTOR: M & W Construction Co., Tupelo, Miss.

PIPE: 30" to 48" T & G Standard and Extra-Strength concrete culvert pipe with TYLOX Rubber Joints, furnished by Faulkner Concrete Pipe Company, Hattiesburg, Mississippi.

Send for

more TYLOX data and case histories. Hattiesburg is only typical of how big and little cities the world over use it to assure fast-working, leak-proof and long-lasting pipe joints. Always write "TYLOX" Rubber Joints when preparing specifications . . . There are no "or equals."

5039

HAMILTON KENT MANUFACTURING COMPANY

KENT, OHIO

427 West Grant St. ORchard 3-9555

To order these helpful booklets check the reply card inside front cover.

NEW LISTINGS (Cont.)

New Supervisory Control Systems

517. A new 10-page bulletin describing supervisory control systems for remote metering control is available from Sparton Control Systems Div., The Sparks-Withington Co., Jackson, Mich. Techniques employed and the results obtained from a number of installations recently made are included. For your copy check the reply card.

Valuable Catalog on Solenoid Valves

527. A new 32 page catalog, No. 201, is available from the Automatic Switch Co., Orange, N. J. The latest designs in ASCO's extensive line of 2, 3 and 4 way solenoid valves are included. It contains engineering information, flow charts, operation and construction details, illustrations and prices. Check the reply card for your copy.

Chlorine Vaporizer System For Converting Liquid Chlorine To Dry Vapor

528. Information on the Whitlock vaporizer system that provides high capacity output at low equipment cost and is ideal for use in water, sewage and industrial waste plants is available from The Whitlock Mfg. Co., West Hartford 10, Conn. Check the reply card for design details, application, features and construction deails.

Buy or Rent Flasher Safety Lights and Barricades

529. A new 3-color catalog describes and illustrates the Flasher Safety Light line of battery-powered hazard warning lights, steel and wooden barricades. The catalog contains action photos, line sketches, complete descriptions and specifications, plus details of the Flasher rental plan. For copies of the catalog write R. D. Fageol Co., Kent, Ohio, or circle the reply card.

WATER WORKS

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes. Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A. Chicago 80, Ill. Check the reply card.

Meters and Instruments For Water Works

43. An attractively arranged 20-page booklet issued by Sparling Meter Co., Box 3277, Los Angeles 54, Calif., furnishes concise data on the full line of Sparling meters, indicator-totalizer-recorder instruments and other special instruments and controls. Check the reply card for your copy, or write for Bulletin 314.

Engineering Information and Water Distribution Products

49. Helpful engineering information, covering water distribution problems, is available from Mueller Company in their W-96 Water Works Catalog. The 328 page catalog features a quick reference sectional indexing arrangement for easy location and identification of the hundreds of water distribution and service products illustrated. Check the reply card and you will receive detailed information on a complete line of water works equipment.

Convenient Reference Manual Covers Cast Iron Pipe, Valves and Hydrants

76. An 80-page manual, issued by R. D. Wood Co. Independence Sq., Philadelphia 5, Pa., presents specifications for "Sand-Spun" cast iron pipe and fittings, outlines types of joints available, lists dimensions and weights in convenient tables and includes, in addition, full engineering data on the Mathews fire hydrant and R. D. Wood gate valves.

What You Should Know About Pipe Locators

94. A new, up-to-date operating manual for pipe detecting instruments has been made available by the Computer-Measurement Corp., 5528 Vineland Ave., No. Hollywood, Calif. Although written chiefly for the Detectron Model 505, it contains operating hints and other information useful with any make pipe detector. To get a copy just check the reply card.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa., or check the reply card.

Verti-Line Primary Water Supply Pumps

110. Vertical turbine pumps for industrial and municipal primary water supply are described in an 8-page bulletin No. 100. Sectional illustrations with enlarged views of special features of the products and detailed drawings of pumping and distribution systems are included. For more information write Layne & Bowler Pump Co., 2943 Vail Avenue, Los Angeles 22, California, or chec the reply card.

Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the reply card for full information including table of filter sizes and capacities, space required and filter operation.

Submersible Pumps For Municipal Use

185. A new 12-page bulletin that describes the line of BJ submersible pumps is available from Byron Jackson Pump Inc., P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif. Construction and operation of the pumps are covered along with a handy selection chart that gives capacity and head performance.

PROGRESSIVE CITIES SELECT

F&E INCINERATOR STOKERS

Designed and manufactured by a century-old concern with 40 years' experience in designing, engineering and completely manufacturing hydraulically-powered stokers.

"F&E" Hydraulically-Powered Stokers are the most talked-of incinerator advancement in the field today.

Should you wish to see an "F&E" Incinerator Stoker in operation and get firsthand information on their revolutionary performance, we will be pleased to advise where the installation nearest you is located.

F&E

FLYNN & EMRICH CO.

301 NORTH HOLLIDAY STREET • BALTIMORE 2, MARYLAND

JOHN DEERE *Utility* Tractor and Equipment

. . . ONE Basic Unit . . .

All These Attachments!

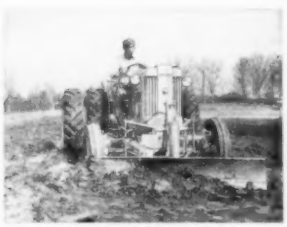
IT'S like eating your cake and having it, too—the way a John Deere Utility Tractor and working equipment will step up the amount of work you can do without increasing your costs.

No matter what make of tractor you are now using—or what tractors you have operated in the past—we believe you will agree you never saw a tractor and equipment that will do so much work, pound for pound, dollar for dollar.

You don't pay for a lot of extras—features like Touch-o-matic hydraulic equipment control, heavy-duty 3-point hitch, and comfortable spring-cushion operator's seat are built right in—yours at no extra cost.

All we ask is that you accept our offer to test-drive a John Deere and make your own comparisons. What could be fairer than that?

Wheel Scraper


Front Blade

Portable Mixer

Clamshell

Plus Many Other Power-Matching Tools

JOHN DEERE Industrial Tractors and Equipment

SEND FOR FREE LITERATURE

Please send me latest literature on:
☐ Utility ☐ Crawler

John Deere Industrial Division, Moline, Illinois. Dept. D66E

Name _____

Firm _____

Address _____

City _____ *State* _____

To order these helpful booklets check the reply card inside front cover.

Meter Features That Help Make Water Works Profitable

59. Simple design, accuracy and long life, moderate first cost and inexpensive maintenance are features of American water meters described in Bulletin No. 55 of the Buffalo Meter Co., 2917 Main St., Buffalo 14, N. Y. Be sure you have this informative booklet which gives the details of American meter design and construction plus full data on sizes, capacities and dimensions. Get your copy by checking the reply card.

Dependable Source For All Chlorine Products

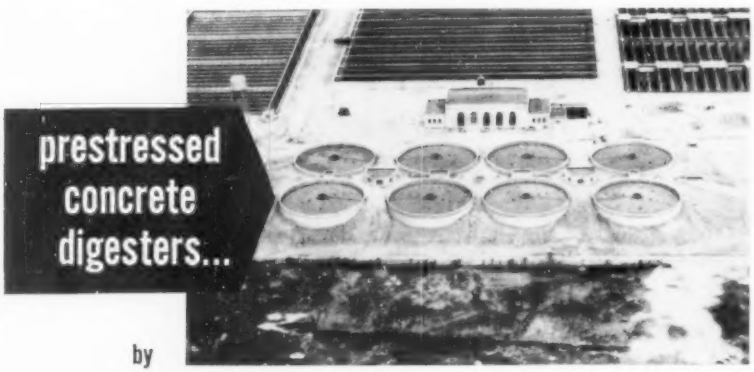
66. Get latest data on Jones chlorine service for liquid chlorine, calcium hypochlorite and sodium hypochlorite packaged in lots best suited for your needs. Six strategic locations serve all parts of the country. Check the reply card or write John Wiley Jones Co., Caledonia, N. Y.

Discussion of Ranney Method For Municipal Water Production

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 5415, Shepard Station, Columbus 19, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the reply card to get your copy.

Auxiliary Electric Power For Public Utilities

249. Full descriptive information on Onan electric plants for every public utility need will be found in literature issued by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Be sure you have latest data on standby plants and controls for emergency electric power. Check the reply card now.

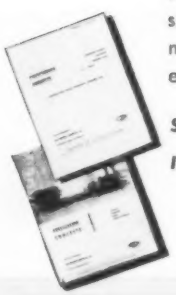


PRELOAD
TRADE MARK

City of Philadelphia, Penna. North East Sewage Disposal Plant. Eight 110'6" inside diameter x 32' high Digesters.

- **Economical First Cost**
- **Maintenance Free**
- **Long Life Expectancy**
- **Architecturally Pleasing**
- **Big Jobs . . . Small Jobs**

If you are planning for Sludge Digestion Tanks, be sure to check on Prestressed Concrete Digesters. Today's most modern installations take advantage of many economies offered by Prestressed Concrete design.



Send for Bulletin T-7 on SLUDGE DIGESTION TANKS

INTERESTED IN WATER TANKS? Send for Bulletin T-12

THE PRELOAD COMPANY, INC.
211 East 37th Street, New York, N. Y.

PRELOAD CONCRETE STRUCTURES INC.
93 North Grand Avenue
Baldwin, L. I., N. Y.
Tel.: BAldwin 3-1300

PRELOAD MIDWEST CONSTRUCTION CO.
2211 East 19th Street
Kansas City, Mo.
Tel.: Benton 1-7104

HERRICK IRON WORKS
P. O. Box 652
Bayshore Annex
Oakland, California
Tel.: Glen Court 1-1767

THE PRELOAD COMPANY, INC.
(Southwest District Office)
423 North Manus Drive
Dallas, Texas
Tel.: WHitehall 2-8849

Complete Catalog on Pipe Line Equipment

121. Listed under one comprehensive catalog No. 26 are a complete line of water, gas and sewer pipe line equipment. Some of the items covered are pipe cutters, diaphragm pumps, melting furnaces, calking tools, M-scope pipe finders and joint runners. Write to Joseph G. Pollard Co., Inc., New Hyde Park, N. Y., or circle the reply card for your copy.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co., Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the reply card.

Manual on Pipe Finding Techniques

213. A manual on special pipe finding and leak detecting techniques of interest to utilities, municipalities, oil and gas companies is announced by Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif. The manual contains a number of articles on locating buried pipes and cables and detecting and locating fluid leaks in pipe lines. Check the reply card for your free copy.

What You Should Know About Fluoridation

217. A helpful publication entitled "Fluoridation" which describes the development of fluoridation and lists the chemicals and dosages normally used has been prepared by Wallace & Tiernan Inc., 25 Main St., Belleville 9, N. J. Copies of publications on both solution and dry feed W&T Fluoridators are also available. These publications are yours for checking the reply card.

For Prompt Service Use The Reply Card

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the reply card or write F. B. Leopold Co., Inc., Dept. PW., 2413 W. Carlson St., Pittsburgh 4, Pa.

Expansion-Contraction Joints, Sealing Compounds and Waterstops

272. Helpful data to aid in the selection of premolded highway joint fillers and joint sealing compounds, rubber waterstops for concrete construction in water and sewage plants, sewer joint sealers and many related materials are provided in latest literature of Servicised Products Co., 6051 West 65th St., Chicago 38, Ill. Get full details by using reply card.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in convenient booklets offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the reply card.

Controlled Closing Air Valve

319. A new concept for the protection of pipe lines against the damaging effects of surge and built-up pressures on water hammer, is graphically illustrated in bulletin No. 200 issued by the Simplex Valve & Meter Co., Lancaster, Pa. This new device can control the speed of line closure, vent air and discharge water. For full information check the reply card.

Points to Consider in Filter Sand Selection

332. Best operation of rapid sand filters requires filter media which is hard, properly shaped, carefully graded and perfectly clean. Filter sand and gravel which meets these exacting requirements is available on short notice from Northern Gravel Company, Box 307, Muscatine, Iowa. Get full details by checking the reply card.

Ruggedness Built In Makes Wagner Stand Out

"Torture Tested" Wagner Tractor Equipment
Gives Longer Life—Reduces Down-Time and Repair Cost

Rugged work requires rugged equipment and that's exactly what you get with Wagner "Torture Tested" tractor equipment. Every stress point is *doubly* protected. Heavy-duty construction keeps maintenance costs way down and productive time way up. Wagner equipment stays on the job day in and day out working for you and more profits. No wonder Wagner tractor equipment is recognized as so far superior it has become No. 1 in America by a wide, wide margin. See all the rugged features of Wagner tractor equipment and the numerous attachments that can make a tractor your most versatile piece of equipment. Get proven dependability no matter how tough the job. Get Wagner tractor equipment today.

wagner
TRACTOR EQUIPMENT

WAGNER IRON WORKS, 1905 South 1st St., Milwaukee 1, Wis. Dept. 129B

Send me more information on Wagner Tractor Equipment for a ..... tractor.
(make)

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... STATE .....

"WAGNER BUILT" MEANS "BETTER BUILT" FOR OVER 105 YEARS

To order these helpful booklets check the reply card inside front cover.

Municipal Water Filter Installation cost can be cut 1/2 to 1/3 with...

SPARKLER *Diatomite* **FILTERS**

Engineers in charge of new Municipal Water Works filtration systems are more and more favoring the SPARKLER DIATOMITE FILTER MODEL SCJ because:—

1. The original cost of a diatomite plant for public supply is ½ to ⅓ the cost of a sand plant of equal capacity.
2. Diatomite filtration reduces the chlorine demand of the water by removing organic matter to an exceptionally high degree. The overall bacteria reduction in the effluent is from 80% to 90%. Sterilization of the finished water can be accomplished with much less chlorine. This results in reducing consumer complaint due to chlorinous tastes.
3. Turbidity less than 5 P.P.M. can easily be maintained at all times even though the raw supply fluctuates greatly. Channeling, mud balling and other common sand filter shortcomings are never a problem.
4. Operating cost compares favorably with conventional sand.

Less than 0.2% of water is required to sluice and clean the Model SCJ filter. The largest filter units can be cleaned and a new fresh diatomite pre-coat applied and the filter back in operation in 20 minutes or less.

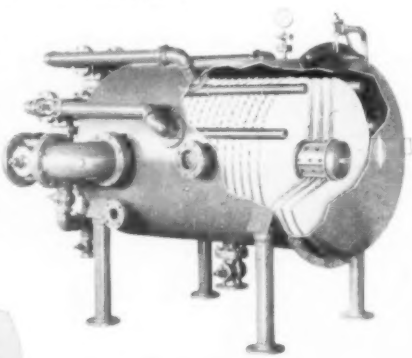
Operators can be easily trained to handle this filter, no highly skilled specialized personnel is required to insure efficient performance.

Sparkler Model SCJ filters can supply practically any required volume of city water. Single units with a capacity of 5,000,000 gal. per day are available. Multiple units including a standby filter is usually employed to insure uninterrupted service for large volume requirements.

Modern electronic control instruments are readily adaptable to these filters, making uniform high quality water supply sure and automatic.

The startlingly low original cost, simple operation, and positive, consistent high quality filtration makes the Sparkler Municipal Water Works filtration system worthy of the most thorough consideration by water works engineers.

Interior construction of Model SCJ Water Filter. Sparkler filtration engineers have introduced, in the SCJ filter, new principles of diatomite filtering that are much superior to old methods and comprise the most advanced innovations in recent years.



SPARKLER FILTERS

SPARKLER MFG. CO., MUNDELEIN, ILL.

Sparkler International Ltd. with plants in Canada, Holland, Italy and Australia — Service representatives in principal cities throughout the world.

Tips for Installing Orangeburg Pipe

336. Good practice for installation of Orangeburg pipe and fittings is outlined in an illustrated four-page bulletin made available by the Orangeburg Mfg Co., Inc., 488 Madison Ave., New York 22, N. Y. Trenching and backfilling, pipe laying, cutting and connecting with other types of pipe are included. Use the reply card for your request.

Modern Filtration of Swimming Pool Water

351. Latest data on filtration systems for swimming pools of 50,000 gallon capacity and over is presented in 24-page bulletin No. 625 by R. P. Adams Co., Inc., 225 East Park Drive, Buffalo 17, N. Y. Design and operating data are provided, together with material to assist you in choosing the right filter for your pool. Check the reply card for your copy of this helpful bulletin.

Testing Water Meters

353. This 40-page catalog is a discussion of fundamentals and a guide to sound practice in meter maintenance. It covers standard specifications of meter accuracy, descriptions of the latest developments in meter testing equipment and many drawings and diagrams. For your copy write The Ford Meter Box Co., Inc., Wabash, Indiana, or check the reply card.

Valuable Information On Prestressed Concrete Tanks

356. This helpful booklet describes the design uses and advantages of prestressed concrete in all types of storage tanks. Plenty of charts, diagrams and illustrations are included. Get yours from The Preload Company, 211 East 37th St., New York 16, N. Y., or check reply card.

All About Centrifugal Pumps

361. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use reply card or write to Fairbanks, Morse & Co., Dept. P. W., Chicago 5, Ill.

Book Tells How to Control Algae

371. Details on the control of various microscopic organisms frequently found in water supplies are furnished in a 44-page booklet offered by Phelps Dodge Refining Co., 300 Park Ave., New York 22, N. Y. Check the reply card.

Information on Pressure Sand and Gravel Filters

406. A 12-page fully illustrated bulletin that completely describes the uses, design features and engineering details of pressure sand and gravel filters is available from Graver Water Conditioning Co., 216 West 14th St., New York 11, N. Y. Details of all accessory equipment, the different types of controls available and a detailed table giving capacities, sizes and space requirements are included. Check the reply card.

How to Choose the Right Self-Priming Centrifugal Pump

427. Descriptive folders on the complete line of contractors' pumps have been issued by the Gorman-Rupp Co., Mansfield, Ohio. 2-in. to 10-in models are illustrated, performance tables are shown and pump selection tables are included to assist in choosing the proper pump for different jobs. Check reply card for your copies.

Portable, Standby Or Continuous Power

440. Generators and power plants for emergency, portable continuous power are described fully in literature available from Katolight Corporation, Box 891-107, Mankato, Minnesota. Information on motor generator sets, high frequency changers and independent generators up to 400 K. W. is included. Check the reply card. today.

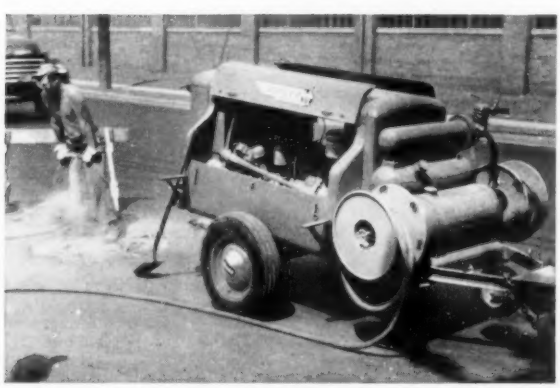
Friction Loss of Head Chart and Flow Powergraph

450. A convenient means of determining friction loss of head and power required to compensate for it. Combines a 2-page loss of head chart with a 1-page powergraph. Data derived from the William and Hazen Formula. Available from Johns-Manville, 22 East 40th St., New York 16, N. Y., or by checking the reply card.

DRIVING AND EXTRACTING SHEETING WITH 1200 CFM OF JAEGER AIR:

To lay a 6′6″ sewer line in Mount Royal, Quebec, Spino Construction and Equipment Ltd. sheeted more than 2000′ of trench 30′ deep. An average of 100 piles per day were driven through asphalt and clay by 9B3 hammer operated by Jaeger "600" Rotary compressor. A second Jaeger "600" Rotary operated the E-4 extractor.

"Smooth as steam" with Jaeger 600 Rotaries



A JAEGER "600" direct connected to a big pile hammer is a striking demonstration of how this modern rotary compressor holds pressure constant under extreme fluctuations of demand. Never before have a compressor unit and its engine been so instantly and closely regulated. Speed modulation is smoothly stepless over the entire operating range. Your Jaeger rotary is also more efficient under all loads, producing its full rated 600 cfm at only 1650 rpm full load speed compared with 1750 to 1800 rpm required by other rotaries.

Smaller Jaeger Roto Air Plus® compressors provide comparable performance. For full details, ask your Jaeger distributor or let us send you Catalog JCR-5.

← **JAEGER "125" ROTARY** (full load speed only 1700 rpm) has full size tool boxes, retractable pneumatic tired dolly, spring tow eye, many other attractive features.

50th year JAEGER CONSTRUCTION EQUIPMENT

THE JAEGER MACHINE COMPANY

400 Dublin Avenue, Columbus 16, Ohio

PUMPS • CONCRETE MIXERS • SPREADERS • FINISHERS • TRUCK MIXERS

To order these helpful booklets check the reply card inside front cover.

Instrumentation and Control For Water Treatment Plants

370. Helpful data on the instruments and control units used for every step of water filtration plant operation are made available to designing engineers by Builders-Providence Inc., 345 Harris Ave., Providence 1, R. I. Dozens of line drawings and descriptive text cover the Venturi meter, instruments for metering and controlling flow, liquid level, pressure and weight and chlorine gas feeders. Get 16-page Application Bulletin 100-K2A by checking the reply card.

Swimming Pool Data Book

373. A 52-page book, profusely illustrated, containing data, photographs and prices of every item needed to build a new residential or public pool, or to equip and maintain an existing pool is now available. There is a section on proper pool care and maintenance and detailed descriptions of approved water treatment chemicals. Book is available by checking the reply card or writing to Modern Swimming Pool Co., Inc., 1 Holland Ave., White Plains, New York.

Sealing of Leaks In Water Pipe

483. The Atlas weld-patch and clamp is used for the instant sealing of leaks in pipes up to 36 inches in diameter. The weld-patch, which is made of steel and neoprene, is as strong as the pipe itself and is secured by electric arc welding without requiring purging or emptying of the pipe. For full information check the reply card or write Atlas Industries, Inc., P. O. 8152, Houston, Texas.

Important Factors in Water Meter Selection

463. Interchangeability of parts is an important advantage that is yours when you use Trident meters. The newest parts fit your oldest Tridents so you modernize when you repair. Get full data on the entire Trident water meter line by checking the reply card or write to Neptune Meter Co., 19 West 50th St., New York 20, N. Y.

SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay under drain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, c/o Editor, Public Works, 200 So. Broad St., Ridgewood, N. J. Check the reply card and we will forward your request.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass. Check the reply card.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet to made on business letterhead.

Stop Sewage Plant Odor Complaints

137. Effective odor control for sewage treatment plants by use of "Orthosolv" is described in literature of Solvay Process Div., Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y. Low cost, convenience and safety are important features. Get full data by checking the coupon.

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflow" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317 B-12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the reply card.

Reduce Labor Costs With Power Sewer Cleaners

189. A complete line of sewer cleaning equipment, including labor saving power units and all types of buckets, cables, rods and flushing equipment are listed in Catalog No. 11 of the Turbine Sewer Machine Co., Division of Chas. H. Stehling Co., 1303 N. Fourth St., Milwaukee 12, Wis. Check the reply card for your copy.

Conveyor Sludge Collector Specifications

210. A new bulletin showing the specifications and components of the type ME Conveyor Sludge Collector is available from Chain Belt Co., Dept. PR, Milwaukee 1, Wisc. Advantages of the collector and photos and line drawings are included. Check the handy reply card for bulletin #315-62.

Have You Heard About Bionetics For Sewage Treatment?

350. Bionetics, a dry staple powder of groups of living organisms preserved with enzyme systems, is available in several types to improve and accelerate the biological processes performed at sewage treatment plants. Get full data from Reliance Chemicals Corp., Box 6724, Houston 5, Texas. Just check the handy reply card.

Catalog on Sewage Gas Meters, Regulators and Valves

245. A handy catalog on sewage gas meters, regulators and valves is available from Rockwell Mfg. Co., Pittsburgh 8, Pa., also included are data on lubricants and accessories, power and remote operation, semi-steel valves and multiport valves. Check the reply card.

Order Direct...Save $150 to $170
New MID WEST *Jiffy-Lift*

A "Packaged" Kit Completely Assembled. Ready to attach with 6 bolts. Install it Yourself and Save.

ONLY **$229.50*** COMPLETE—DELIVERED! Including Federal Excise Tax

* East of Rockies. Local and State Tax, if any, extra.

MIDWEST Jiffy-Lift

Fits All ½-¾-1-Ton Pick Up and Express Bodies

A "Freight elevator" on the back of your truck permits one man to handle up to 600 lb. loads. Patented mechanical lifting mechanism. Ball bearings throughout for easiest operation. Has all important safety features. Long life—NO maintenance problems. Heavy gauge steel ramp-type gate lifts from ground to truck floor and swings upright. Weighs only 175 lbs. Won't increase license fee. No overload springs necessary. Install in your own shop. Order direct from Distributor or Factory.

ORDER TODAY . . .

MID WEST BODY & MANUFACTURING Date_____
PARIS, ILLINOIS Dept 101

Please ship us _____ "Jiffy-Lifts" Our Check is enclosed ( ). Please ship C.O.D. ( ).

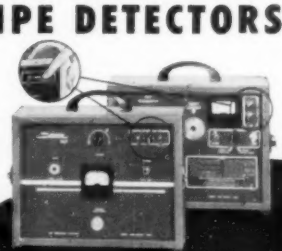
NAME_____
ADDRESS_____

( ) Please send descriptive literature No. 101

It's True There are Other "Good" PIPE DETECTORS

and EACH ONE WILL PERFORM ALL THESE JOBS:

- Detect, trace and center pipes, cables, etc.
- Estimate their depth
- Separate parallel pipes, cables, etc.



Model 505 Pipe Detector

But... Do They Have ALL These "505" Features

1. ALUMINUM CASE shields the loops from outside interference and is light — durable — repairable.
2. BUILT-IN BATTERY TESTERS plus 67½ V batteries insure maximum service, more efficiency, more power.
3. QUICK-ACTION ALUMINUM HANDLE set up in seconds for one man operation.
4. LIFETIME GUARANTEE assuring reliable performance for the entire life of instrument.

Also Available: Model 505-C Combination Pipe-Leak Detector

Get the complete "505" story — write Dept. 55.

Detectron

COMPUTER-MEASUREMENTS CORP.
Utilities Instrument Division
5528 Vineland Avenue North Hollywood, California

MUELLER®

add gate valves without shutdown

It is a simple matter to replace inoperable valves or to add needed control at vital points in your water system. The Mueller H-800 Inserting Valve may be installed in any existing line under pressure. Flow through the main is not interrupted and there is no loss of water. Gate valve mechanism is identical to Mueller A. W. W. A. standard gate valves with interchangeable parts. Once installed in line, valve is operated like an ordinary gate valve.

Write for the "how to do it" story on Mueller Inserting Valves. It gives a simple step by step procedure for making the installation under pressure.

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS

To order these helpful booklets check the reply card inside front cover.

Get the Facts on The Contact Aeration Process

303. Full engineering details on the submerged contact aeration process of sewage treatment, including diagrams of plant units, area requirements, operating costs and other details are available in a bulletin of the Hays Process Co., Box 768, Waco, Texas.

Diesel Engines For Municipal Power Needs

359. Dependable power for water supply or flood control pumping stations, stationary or portable electric plants and many other municipal needs can be provided by engines described in literature of the Enterprise Engine & Machinery Co., 18th & Florida Sts., San Francisco 10, Calif. Get latest data by checking the reply card.

Roll-On Joint Pipe For Water, Sewage or Other Liquids

388. American Roll-on Joint Pipe that is centrifugally cast in sand-level molds for water, sewage or other liquids is described completely in catalog just released by American Cast Iron Pipe Co., Birmingham, Alabama. Applications, specifications, design, class, assembly and disassembly are included. Check the reply card.

A Precast Concrete Filter Bottom

394. The Criscrete unit is precast prestressed concrete built monolithically spanning the entire width of the filter in one piece. It requires 6 in. overall depth in the filter and employs non ferrous nozzle liners. For complete information on this filter unit get literature available from MCG Co., 1771 W. 5th Ave., Columbus 12, Ohio, by checking the reply card.

Modern Methods and Materials For Jointing Sewer Pipe

402. In a compilation of reprints and related supplementary material, the Atlas Mineral Products Co., Mertztown, Pa., presents a comprehensive review of all types of sewer jointing materials and methods. You will find this interesting and informative reading. Get a copy by checking the reply card.

Data Offered on Water, Sewage and Waste Treatment Equipment

263. Equipment for sewage treatment, water purification and industrial waste treatment is described in a 16-page Book No. 2440, published by Link-Belt Co., Colmar, Pa. Case histories, photographs and schematic drawings are included. Straightline and Circuline collectors, Thru-Clean and Straightline bar screens, Tritor screens, flash mixers, scum breakers and other units are described. Check the reply card for your copy.

Complete Story of Rubber as a Coupling Medium in Pipelines

295. "Joint Enterprise", a booklet describing Tylox rubber joints for coupling pipe used in sewerage, drainage and waterworks projects is now available from Hamilton Kent Manufacturing Co., 27 West Grant St., Kent, Ohio. The booklet also contains illustrated case histories of Tylox-Jointed installations, and suggestions to assist engineer in specifying Tylox joints for both tongue and groove, and bell and spigot pipe. Check the reply card.

Solids Pump Uses Recessed Impeller

428. The Wemco "Torque-Flow" solids pump works with a completely recessed impeller which creates a vortex effect and transmits power exactly as in a fluid type torque converter. This avoids flow through impeller vanes and reduces clogging difficulties when handling sewage sludge or abrasive materials. For full details get Bulletin SP-10 by writing to Western Machinery Co., 760 Folsom St., San Francisco, Calif., or check the reply card.

New Catalog on Flexible Compression Fittings

453. This 12-page catalog, well illustrated both by photographs and drawings, highlights the use of these fittings on steel piping and copper tubing. Illustrations taken from case histories and featured throughout the catalog, will be of special interest to equipment designers and piping engineers. Get your copy from Dresser Mfg. Div., Bradford, Pa., or check the handy coupon.

CONSTRUCTION EQUIPMENT AND MATERIALS

For Fast, Smooth Pipe Cuts

68. Descriptive literature on the Reed 4-wheel hinged pipe cutter which operates in close quarters, gives quick, easy right-angle cuts, and is available from Reed Mfg. Co., Erie, Pa. Check the reply card.

Inexpensive Ditcher Handles Heavy Diggings

91. The Shawnee Scout Ditcher, a heavier model for extensive digging, has been added to the Shawnee line of ditchers and dozers. All models are designed to handle ditching and backfilling operations quickly, efficiently and at low cost. Full information on this equipment will be sent by Shawnee Mfg. Co., 1947 N. Topeka, Topeka, Kansas. Just check the reply card.

A Gasoline Engine For Many Municipal Jobs

161. Catalog on a power packed 2-cycle gasoline engine that is designed to do many municipal jobs is available from Mall Tool Co., 7752 South Chicago Ave., Chicago 19, Ill. Information on how this lightweight maneuverable engine can power a dozen attachments is included. Check the reply card.

Handbook of Castings For All Public Works Construction

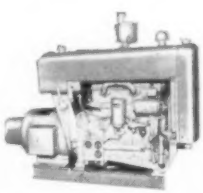
220. Every type of construction casting needed by engineers and contractors in the public works field will be found in a 136-page catalog issued by Neenah Foundry Co., Neenah, Wis. Detailed illustrations and complete tables of dimensions will help the designer and materials buyer. Get your copy of this valuable catalog by checking the reply card today.

UNIVERSAL Electric Power and Light Plants . . . today's biggest VALUES!

GASOLINE — compare the prices, capacity and operating features and you'll agree that Universal offers the best models for your work. Hand-carried, dolly and portable models, air-cooled from 250 watts to 12,000 watts. Also, battery chargers. Water-cooled gasoline models to 35 k.w. Compact, lightweight, your choice of controls.

This compact Universal develops 800 watts, 110 volts, A.C.

DIESEL —the industry's newest most advanced line . . . offering distinctive weight- and space-saving advantages. Models from 8 k.w. to 35 k.w.—all competitively priced, ready for fast delivery. A Universal diesel generating set will cost you less to buy and operate—and deliver more years of dependable service. Full diesel, all types of controls.



For steady, low-cost power, contractors use this 8-10 k.w. diesel model.

Helpful Literature Free! Ask for foldout fact bulletins giving complete specifications on Universal gasoline models . . . also complete specification bulletin on diesel models.

UNIVERSAL MOTOR COMPANY

A manufacturer since 1898

643 Universal Drive, Oshkosh, Wisconsin

PALMER

ANTHRAFILT FILTER MEDIA

TECHNICAL ADVANTAGES

- 1—Requires an average of 40% less wash water
- 2—Completely eliminates mud balls
- 3—Eliminates cracking or shrinking of the beds
- 4—Produces "new" filter media after short period of normal operation
- 5—Turns out purer, better tasting water
- 6—Low installation cost
- 7—Low operating cost
- 8—More water through the filters
- 9—Less "time out" washing filters

PALMER

FILTER BED AGITATORS

FAR SUPERIOR to Sand or Quartz Media, as it Double length of Filter runs, nearly halves wash water needs; with less coating, caking, or balling.

Filters are in service more as wash water cycle shorter. Better removal of bacteria, taste, odor. Increased Filter output, better effluent. Ideal for industrial acid and Alkaline solutions. Ask any user.

PALMER FILTER EQUIPMENT CO.

822 E. 8th St. • Erie, Pa.

BRING ON YOUR RIVERS!

CLOW RIVER-CROSSING CAST IRON PIPE TAKES 'EM "IN STRIDE"!

EASY TO LAY. As easy to make up as a standard flanged joint. Lower labor installation cost because of ease of joint make-up and longer laying lengths.

ONLY A RATCHET WRENCH NEEDED. No split parts. Fewer parts—each joint consisting of one complete pipe, one solid follower ring, one solid ring gasket, bolts and nuts.

FULL 15° TURNING DEFLECTION with absolutely no reduction in the full internal opening area—therefore, no abnormal pressure-drops at deflected joints. Deflection stresses evenly distributed among all the bolts.

LONGER LAYING LENGTHS—approximately 18'6"—faster installation, lower costs. However, lengths may be varied to suit conditions. For example: 6 foot, 12 foot or other special lengths may be advisable to suit required curvature.

Mail coupon for complete information on Clow Ball-and-Socket River-Crossing Pipe. No obligation, naturally.

JAMES B. CLOW & SONS

201-299 North Talman Avenue • Chicago 80, Illinois

Subsidiaries:
Eddy Valve Co., Waterford, N. Y.
Iowa Valve Co., Oskaloosa, Iowa

JAMES B. CLOW & SONS
201-299 North Talman Avenue
Chicago 80, Illinois

Please send me, without obligation, details and specifications of Clow Ball-and-Socket River-Crossing Pipe.

Company_____
Street Address_____
City_____ Zone_____ State_____
Individual's Name_____
Position_____

To order these helpful booklets check the reply card inside front cover.

A Tractor-Air Compressor Unit

140. "Around the Clock, Around the World" is the title of an 8-page bulletin describing Le Roi's new 125 Tractair, a self-propelled compressor unit with flexible tractor power. Applications, uses, attachments and tools, design and specifications of the compressor and engine are listed. Write Le Roi Division of Westinghouse Air Brake Company 1706 South 68, Milwaukee 14, Wisconsin, or check the reply card for your copy.

Booklet Helps Design of Custom-Engineered Steel Buildings

271. Custom-engineered Butler steel buildings are available in every size, type and design to meet your building needs. In a helpful 16-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the reply card or write to Butler Mfg. Co., Kansas City, Mo.

Advanced Tractor Design Gives Better Performance

399. The Ford Tractor offers 4-wheel stability, built-in hydraulic system, power take-off, as well as greater power, performance and economy. A complete booklet describes five tractor models in two power series, showing the latest in advanced tractor design and including many applications of equipment for saving time and money. For your copy check the reply card or write Tractor and Implement Division, Ford Motor Co., Birmingham, Mich.

How to Select Paints For Every Maintenance Need

467. Selecting the right paint for each maintenance need involves consideration of the service to be rendered, conditions of their use and abuse, and the surfaces to which they are to be applied. To help you determine what to use on various surfaces, an industrial paint index printed in the form of a handy file folder has been prepared by the Tropical Paint and Oil Co., Cleveland 2, Ohio. Get a copy by checking the reply card.

Black Top Road Maintenance and Construction Equipment

286. A highly informative, 36-page catalog, covering the entire field of highway and road maintenance equipment has been released by Littleford Bros. Inc., East Pearl St., Cincinnati 2, Ohio. Units described and illustrated include distributors, supply tanks, sprayers, brooms, rollers, heater-planer, asphalt kettles and accessory tools. Check the handy reply card for your copy of this valuable catalog.

Davis Back-Hoe and Davis Loader

312. Literature is available from Mid-Western Industries, Inc., 1009 S. West St., Wichita, Kans., describing the new Davis back-hoe and Davis loader. The back-hoe can dig at right angles and to a depth of 13 ft. and detaches in 5 minutes. Both units are available for most popular makes of tractors. Check the handy reply card for more information.

For Prompt Service Use The Reply Card Inside Front Cover

Restoration and Protection Of Concrete Structures

385. A "How to Do It" bulletin describing the Thoro System for repair and sealing interior and exterior masonry surfaces is available from Standard Dry Wall Products, Inc., New Eagle, Pa. The treatment for every water problem is presented in illustrated case histories in this useful publication. Check the reply card for your copy.

Handbook on Hot Rolled Carbon Shapes and Plates

412. A handbook every engineer should have on hot rolled carbon shapes and plates has just been released by United States Steel Corp., 525 William Penn Place, Room 5118, Pittsburgh 30, Pa. Check the handy reply card.

Sherman Power Digger For Digging in Any Soil

493. Sherman Major power digger literature is now available, providing details on this new hydraulic backhoe designed specifically for attachment to Fordson-Major tractors. The unit can dig to a depth of 12½ ft. and can dig through a 180° arc of swing and to a loading height of 8 ft. 8 in. Specifications and operation are fully covered. The 8-page colored catalog can be obtained from Sherman Products, Inc., 3200 West 14 Mile Road, Royal Oak, Mich., or by checking the handy reply card.

A Most Economical Scraper For Cities and Counties

499. A scraper that is capable of moving 100 to 150 cu. yds. per hour of earth is described in literature available from the Soil Mover Co., Dept. PW-9, Columbus, Nebr. It is hydraulically operated from tractor seat and has front pick-up and rear dump and is available for 25 to 50 hp wheel tractors or small crawler tractors. For prices and other information check the reply card.

The Crawler Tractor, Backbone of Construction

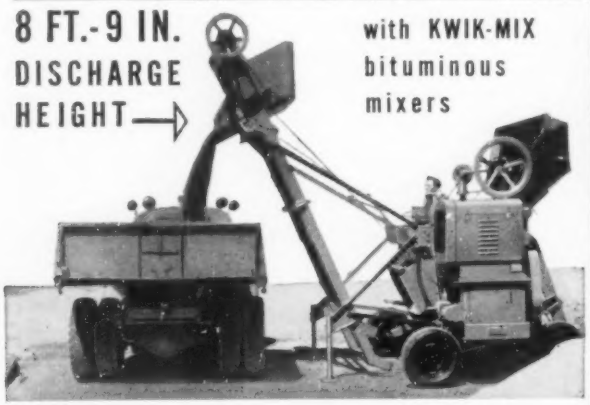
504. A new 12-page catalog published by American Tractor Corp., Churubusco (Ft. Wayne), Ind., graphically illustrates how and where the 30 to 60 hp TerraTrac tractors fit in the construction picture. Illustrations of the complete tractor line, plus a complete selection of matching loaders, dozers, backhoes, scarifiers and winches are included. Check the reply card.

Water Lines Under Pavements Easily Installed

247. With a Trojan pipe pusher and puller no resetting of grip is required, so the work goes twice as fast. Two models, for pipe up to 2" dia. The larger model is available with air power unit to eliminate manual pushing. Get full details by checking the reply card. Trojan Mfg. Co., 1114 Race Dr., Troy, Ohio.

8 FT.-9 IN. DISCHARGE HEIGHT →

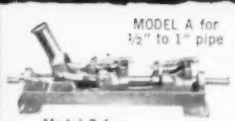
with KWIK-MIX bituminous mixers



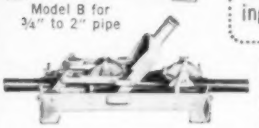
Now you can load bituminous mix into trucks, overhead hoppers, or stockpile, with Tower Loader attachment on Kwik-Mix Bituminous Mixers. Available on either the 10 or 14 cu. ft. mixers, tower provides 7'-9" to 8'-9" discharge height. Big bucket holds full mixer batch, is raised by power, dumps automatically at top of tower. Bucket travel and discharge are completed while next batch is being mixed. No delay to mixer production. It is single-lever controlled, and powered by mixer engine. Tower is hinged for travel clearance. See Kwik-Mix distributor or write.

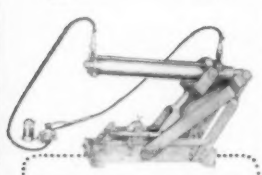
Mail to: KWIK-MIX CO., 3029 W. Concordia, Milwaukee 16, Wis.
(Koehring Subsidiary)
Send literature on Tower Loader and Bituminous Mixers
NAME _____
TITLE _____
ORGANIZATION _____
ADDRESS _____ KM387PW

Only the Trojan Pipe Puller & Pusher
gives you continuous action . . .
No Resetting of Grip!



CUTS COSTS! SAVES TIME- in installing or renewing pipe under pavement





The Trojan combines pushing and pulling operations in one machine—eliminates all time-killing resetting of grip—keeps pipe continuously moving. Does the job at lower cost—in far less time.

Model A weighs 65 lbs.—requires only 5' trench. One man can easily install the average service. 15 tons of pushing pressure possible.

Model B (either hand or air powered) needs only 5½' trench—has 3 speeds for different soils—is reversible in 30 seconds. Push pipe comes in 30" lengths, assures straight travel.

NEW AIR POWERED Model B
Does all the work for you. Handles ¾" to 2" pipe.

Write today for full details!

The TROJAN Manufacturing Co.
1114 Race Drive • Troy, Ohio

THE MAN WHO SAID *"No!"*

He's a business man looking for a place to build a new plant . . . a plant that will bring prosperity and growth to the community he chooses. Water supply is one of the most vital questions, and many a golden opportunity has been lost by a community because its water system is inadequate.

In Plattsburgh, N. Y., the story was different. Wasteful habits were causing water shortages, so Plattsburgh decided to install water meters. As a result, they "found" 1,400,000 more gallons daily . . . enough to supply a new Strategic Air Command Base now located there.

Even communities who have had meters for many years . . . but have allowed them to run down . . . can "find" more water simply by repairing the meters.

These savings are *real*. The meters give a strong money incentive for conservation. They help keep wells and reservoirs from running dry. The same filter plants and water mains may serve up to twice as many customers . . . with lower daily operating costs.

Your Neptune Trident meter representative will be glad to offer further evidence.

279

NEPTUNE METER COMPANY
19 West 50th Street • New York 20, N. Y.

NEPTUNE METERS, LTD.
1430 Lakeshore Road • Toronto 14, Ontario

Branch Offices in Principal American and Canadian Cities.

To order these helpful booklets check the reply card inside front cover.

SNOW AND ICE CONTROL

End Dangerous Ice Hazards

294. Many progressive municipalities use rock salt as standard practice for prevention of ice hazards on streets and highways. Get full data on Sterling "Auger-Action" Rock Salt and suggestions on storage methods from International Salt Co., Scranton, Pa. Check the reply card today.

Reversible and Roll-Over Type Snow Plows for any Depth of Snow

389. Village, city, county, state and airport officials send for the latest information on Frink's two catalogues on reversible trip-blade and roll-over snow plows. Complete assembly details, specifications and operation are completely outlined. Write to Frink Sno-Plows, Inc., Clayton, Thousand Islands, New York, or check the reply card for the catalogues.

Ice Control Without Corrosion Dangers

439. Virtually all corrosion is prevented when rust inhibitor "Banox" is used in conjunction with salt for snow and ice control. Properties of this material and performance results are described in bulletins issued by Calgon, Inc., Hagan Bldg., Pittsburgh 30, Pa. Check reply card for your copies.

Ice Control Spreading Equipment

426. The Baughman "Salt Miser" clamps to tail gate of any dump truck and gives it a complete unit for ice control. The auxiliary gas engine runs at constant idling speed and is cheaper to run continuously than to keep starting and stopping. For full details write to Baughman Manufacturing Co., Jerseyville, Illinois or check the reply card.

STREET LIGHTING AND TRAFFIC CONTROL

Catalog on Floodlighting and Area Lighting Poles

194. Complete information on floodlighting poles for athletic field, parking lots and shopping centers is fully described in catalog from The Union Metal Mfg. Co., Canton 5, Ohio. Mounting arrangements, aluminum and steel monotube poles, hinged floodlighting poles and pump island poles are a few of the items covered. Check the reply card.

Engineering Guide to Mercury Street Lighting

380. Basic engineering aspects of mercury vapor street lighting are discussed in a 35-page Engineering Guide available from Westinghouse Corp., Box 2099, Pittsburgh 30, Pa. This practical reference includes technical data on mercury lamps applicable to general lighting service, operating characteristics of the system and a discussion of methods of economic evaluation of alternative lighting systems. Check the reply card for your copy of this helpful guide.

Kaiser Aluminum Signs and Markers

457. A 12-page booklet containing information on highway signs and markers has just been published by Kaiser Aluminum & Chemical Sales, Inc., Consumer Service Division, PR-856. The booklet lists sizes and availabilities of various types of sign blanks and also included is detailed information on methods of finishing aluminum sign panels by applying reflective sheeting, paint, baked and porcelain enamel. Check the handy reply card.

A Guide to Effective Traffic Safety

468. A 20-page catalog with hundreds of illustrations of all types of signs used on highways and in motor and pedestrian traffic areas is offered to public works officials by Traffic and Street Sign Co., 84 Foundry St., Newark 5, N.J. This convenient reference covers all your sign needs. For your copy check the reply card today.

REFUSE COLLECTION AND DISPOSAL

Developments in Refuse Collection

119. The "Dempster-Dumpmaster" system for refuse collection combines the advantages of detachable containers for bulk collection, convenient front-end loading and compaction in a sealed body. Be sure to investigate the application of this system to your collection needs. Complete data offered by Dempster Bros., Knoxville 7, Tenn. Check the reply card today.

New M-B Packer Body Designed for Maximum Payload

309. The M-B Packer Body, designed to provide maximum payload on a minimum size, low-cost truck, features effective, simple compaction system; provides easy loading, positive discharge, all safety features. Available in 12-14-16, 20, 24 cu. yd. capacities. Get all the facts from M-B Corp., New Holstein, Wis.

How to Construct A Sanitary Fill

331. A new 12-page booklet which tells the most efficient method of sanitary fill construction and furnishes complete information on planning and operation is now available from Drott Mfg. Corp., Milwaukee 15, Wis. Get your copy by checking the reply card; you'll find this booklet both interesting and valuable.

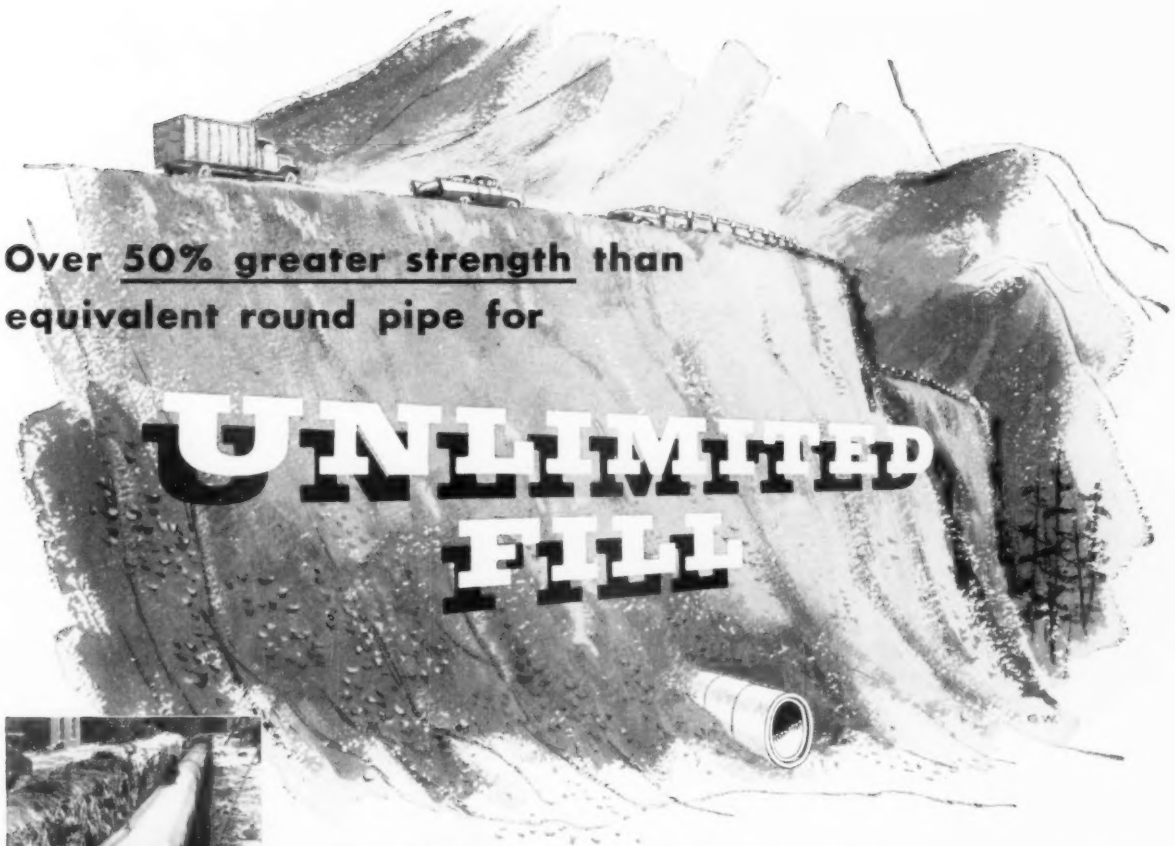
Weed control saves money here

Chemical weed and brush control pays off anywhere, but especially in hard-to-cut places like this. One spraying not only improves the appearance but saves hundreds of man-hours.

Whatever your weed and brush control requirements, DIAMOND has the information and the solution. As one of the world's largest makers of herbicides, DIAMOND has the experience and the facilities to help you select the right chemical formulation for the job. For information, write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, O.

DIAMOND CHEMICALS

Diamond Chemicals



HI-HED makes a perfect utility gallery. Pre-cast HI-HED units speed installation and cut construction costs.

HI-HED REINFORCED CONCRETE PIPE

Deep cuts and high fills are often encountered in maintaining the minimum grades which are consistent with good highway design. In the past, drainage structures under high fills have proved delaying, cumbersome and costly. But now, American-Marietta offers you a practical solution—HI-HED Reinforced Concrete Pipe with *50% greater strength than its round pipe equivalent.*

When used as storm or sanitary sewers HI-HED permits greater self-cleansing velocities in dry weather periods. In urban areas HI-HED makes full use of available cross-room without disturbing existing utilities. Find out more about HI-HED, the stronger, versatile, elliptical pipe that's destined for an important role in the multi-billion dollar highway program. Write today.

Our technical staff will be pleased to assist you with your pipe problems.

AMERICAN-MARIETTA COMPANY
CONCRETE PRODUCTS DIVISION

GENERAL OFFICES:
AMERICAN-MARIETTA BUILDING,
101 EAST ONTARIO STREET, CHICAGO 11, ILLINOIS PHONE: WHITEHALL 4-5600

DIVISIONS AND SUBSIDIARIES

B. C. Concrete Company, Ltd.
Concrete Conduit Company
Tellyer Concrete Pipe Co.
Concrete Products Co. of America
Lamar Pipe and Tile Company
Lewistown Pipe Company
Universal Concrete Pipe Co.
American-Marietta Company of Pennsylvania

To order these helpful booklets check the reply card inside front cover.

"Blow-Up Proof" Filter Bottom with UNIFORM Distribution

Criscrete

. . . Not a block system, but a span of reinforced concrete over entire filter bottom and only 6" deep. Easy installation and proven economy.

Write for field test data, installation list and brochure on Criscrete underdrain system.

M-C-G Company, 1771 W. 5th Ave., Columbus 12, Ohio

Learn how to cut survey costs up to 75%!

Every project planner should have this valuable new brochure. It tells how Alster aerial mapping methods—guaranteed accurate—cut survey costs as much as 75% compared to ground survey prices . . . and get construction under way weeks earlier. It's yours for the asking.

ALSTER & ASSOCIATES, INC.
AERIAL SURVEYS

SEND TODAY!
Dept. P-9

6135 KANSAS AVE., N.E., WASHINGTON 11, D.C.
29 E. MADISON ST., CHICAGO 2, ILLINOIS

TOPOGRAPHIC • PLANIMETRIC • MOSAIC MAPS

New Roto-Pac Features Speed Refuse Collection

50. Features of the Roto-Pac refuse collection unit, which include automatic continuous loading and packing, with increased power to provide for larger loads in the same size body, are described in bulletins issued by City Tank Corp., 53-09 97th Pl., Corona, L. I. Check the reply card now to learn how your collection problems can be eased.

How New, Larger Load-Packer Cuts Refuse Collection Costs

51. Ever increasing problems in refuse collection work include longer hauls and higher costs of labor, chassis, operation and maintenance. As a solution, Gar Wood offers Load-Packers with dual-thrust compaction that gives big capacity on shorter wheelbase, plus safe, labor-saving operation. Profusely illustrated Form W-144 tells why you should investigate Load-Packers. Check reply card or write Gar Wood Industries, Inc., Wayne, Mich.

Engineering Data on Incinerator Design

118. A comprehensive bulletin which provides full engineering data on municipal refuse incineration is offered by Pittsburgh-Des Moines Steel Co., 3422 Neville Island, Pittsburgh, Pa. This 20-page booklet shows basic requirements for satisfactory incineration, gives incinerator design details and describes modern mechanical stoking, construction features and modernization of existing plants. Get your copy by checking the reply card.

Catalog on the Flynn and Emrich Incinerator Stokers

180. This catalog describes the Flynn and Emrich Incinerator stokers as to design, feeding capacities and loadings. Plenty of drawings of the stokers and photographs of incinerator plants under construction and in operation are included. Also, there is a good section on the incinerator history. Check the reply card today for catalog No. 1702 from Flynn and Emrich Co., Holliday and Saratoga Sts., Baltimore 2, Md.

For Prompt Service Use The Reply Card

Why Cities are Shifting to Pak-More Collection Bodies

216. Reduced costs of refuse collection with 12 to 50 yard bodies; faster loading; dense compaction; quicker emptying; sealed doors and simple controls are among the advantages cited in 16-page booklet describing Pak-Mor refuse collection equipment. Get full data from Pak-Mor Mfg. Co., Box 6147, San Antonio, Texas, or check the reply card.

What You Should Know About Refuse Incinerators

362. Two helpful bulletins tell what you should know about low cost refuse incineration for the small community and for larger cities. Your questions on mechanical stoking, burning rates and operating problems are discussed. Get Bulletins 217 and 223 from Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y. Just check the reply card.

Check These Features On Refuse Collection Bodies

383. The Heil "Colectomatic" refuse collection unit incorporates the best features suggested by municipal operating crews, supervisors and private operators to provide easy loading, simple operating mechanism, bulldozer type packing, fast dumping and many other important advantages. Available in 16 and 20 cu. yd. capacities. Check them all by getting attractive Bulletin BH-54103 from The Heil Co., 3044 W. Montana St., Milwaukee 1, Wis. Your copy is ready—just check the reply card.

Questions and Answers About Sanitary Landfills

482. This booklet will be of great value to city and county engineers thinking about sanitary landfill. Nineteen specific questions are thoroughly answered in this 20-page, two-color booklet. Covered are the various landfill methods, how to approach each, how much land is required, equipment needed and other information. Check the reply card or write Caterpillar Tractor Co., Peoria, Ill. and request Form No. DE620.

The Power Drive that Gives You Everything!

New RIDGID No. 200 Tripod Power Drive with Folding Tray

Really Portable—Lightweight, legs and tray fold in snugly, handy handle for carrying.

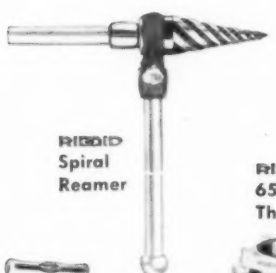
Easily, Quickly Set Up—Built-in folding tray and legs open up for business instantly—all one unit, no loose parts.

Extra Rigidity—Open tray holds legs in strong, solidly rigid stance, adds strength. No front leg to obstruct swing of die stock handles.

Fast Easy Speed Chucking—Guaranteed to grip tight forward and reverse—no slip, even with geared tools. Replaceable insert jaws for long service.

Extra Power—Motor has larger long-life brushes, longer commutator, won't bog down under extra load.

Power for any hand pipe tools ⅛" to 2" pipe, ¼" to 2" bolts; geared tools to 12".



RIDGID Spiral Reamer

RIDGID 65R Pipe Threader

RIDGID Heavy-Duty Pipe Cutter

You can't beat it for performance, easy work and durability. Buy it at your Supply House . . . much the most for your money!

RIDGID Work-Saver Pipe Tools

The Ridge Tool Company, Elyria, Ohio, U.S.A.

To order these helpful booklets check the reply card inside front cover.

POWER *ON THE JOB... ON WHEELS!*

Used Daily by MUNICIPAL DEPARTMENTS throughout the country!

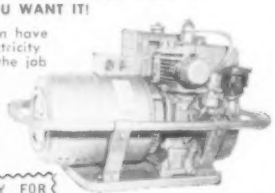
Wide selection of Katolight Plants driven by air or water cooled gasoline engines up to 75 KW.

Katolight *PORTABLE*

POWER PLANTS

. . . ELECTRICITY WHERE YOU WANT IT
. . . WHEN YOU WANT IT!

Your crews can have "plug-in" electricity anywhere on the job for operating electrical tools, lights, equipment.



SEND TODAY FOR NEW FREE FOLDER ON NEW LIGHTWEIGHT PORTABLE MODELS

Sizes and models for every portable or stand-by need from 350 Watts to 75, KW A.C. Up to 400 KW on request.

KATOLIGHT CORPORATION MANKATO, MINN. Box 891-107

TWO PIECE

sliding or screw type cast iron valve boxes for covering 4" thru 10" valves for water or gas. Rugged construction for lifetime service. 5¼" shaft. Extensions as required.

Adjustable
VALVE BOXES
THREE PIECE

valve boxes supplied with separate bases are available in sliding or screw type. Made with 5¼" and 7" shafts with extensions as required. Complete line of service and roadway boxes.

ALABAMA PIPE CO.

We Invite Inquires to Our Nearest Sales Office
120 S. Michigan Ave. / 350 Fifth Avenue
Chicago, Illinois / New York 1, New York
General Sales Offices
ANNISTON, ALABAMA

APCO

STREETS AND HIGHWAYS

How to Select Prestressed Concrete Bridge Members

26. Colorful folder, well illustrated, shows manufacture of "Amdek" prestressed bridge members and provides selection tables covering several AASHO loadings. Full data from Concrete Products Div., American Marietta Co., 104 East Ontario St., Chicago 11, Ill. Check the reply card for your copy of this helpful reference bulletin.

Uses and Erection Data of Barrier Beam Guard Rail

46. Typical installations, erection instructions, specifications, curving data and physical properties of the barrier beam guard rail are fully covered in the catalog available from United Steel Fabricators, Inc., Wooster, Ohio. Plenty of photographs and drawings are included. Check the reply card.

Useful Attachments for "Payloader" Tractor Shovels

95. Increased versatility for Hough "Payloader" tractor shovels is made possible by the various attachments described in literature of the Frank G. Hough Co., 761 Seventh St., Libertyville, Ill. Illustrated and described are rotary "V" and trip-blade snow plows, hydraulic backhoe, back-filler blade, pickup sweeper, scarifier teeth, winches, etc. Check the reply card today and full details will be sent.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2½" to 14½" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydrauger Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered. Check the reply card.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio. Use the reply card to get your copy.

Choosing Trucks For Municipal Service

204. Trucks that are high in efficiency and economy are needed for all municipal services. Be sure to investigate latest models of White motor trucks, engineered for high performance under all conditions. Full details from White Motor Co., Cleveland 1, Ohio. Check the reply card today.

What Should You Look For In a Power Sweeper?

206. Helpful information to aid you in the selection of a power sweeper to fit your needs is provided in Bulletin 85.2, issued by G. H. Tennant Co., 2530 N. Second St., Minneapolis 11, Minn. Full data on the highly maneuverable Tennant Model 75 Sweeper is included. Get your copy by checking the reply card.

Latest Data on Prestressed Concrete Lighting Standards

265. Comprehensive data on prestressed concrete standards for street and highway lighting is contained in a 24-page catalog which contains complete engineering tables and descriptive information on design features, mounting arrangements, base type choices and specifications of Hy-Lite standards. Get helpful and easy-to-read Catalog No. 300 by writing to American Concrete Corp., 5092 No. Kimberly Ave., Chicago 30, Ill., or check the reply card.

How to Cut Weed Control Costs

268. Information on a weed killer that can save hundreds of man-hours of clearing and cutting is available from Diamond Alkali Co., 300 Union Commerce Bldg., Cleveland 14, Ohio. Whether you want to control weeds or brush or both, without damage to crops or ornamentals, get this literature today by checking the reply

Self-Propelled Sidewalk Paver Lays Up to 10 Ft. per Minute

117. Bulletin 53, released by Dotmar Industries, Inc., Kalamazoo, Mich., describes the Dotmar paver, which can lay up to 10 ft. per minute of walk when working with transit mix units. Paver is readily convertible to pave curb and gutter, or integral curb, gutter and walk. Get the 8-page illustrated bulletin for full data and reports from users. Just check the handy reply card.

Information on Rigid Roll and Pneumatic Compaction

155. This compaction unit offers pneumatic compaction through oscillating, spring-mounted wheels and rigid roll compaction by rubber-tired rolling. The roller can be used independently or together and offers full power hydraulic steering through 180°. Catalog is available on complete specifications and details from Seaman-Gunnison Corp., 201 Lynn Ave., Baraboo 13, Wisc., or by checking the handy reply card.

A Street Sweeper For Every Sweeping Need

158. A new catalog containing eight pages of illustrated information on street sweeping with the Mobil Sweeper, motor pickup type street sweeper, is just off the press. It is used on streets, highways, airports, parks, parking areas and other paved areas. For your copy write Mobil Sweeper Div. of the Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif., or check the reply card.

Literature on Galion Roll-O-Matic 3-Wheel Roller

187. A highly illustrated catalog is now available on the new Galion "Chief" 3-wheel roller. All important features of design and construction are presented in detail. Detailed weight distribution and compression data on the various sizes of rollers are listed along with a complete line of attachments. Check the reply card or write Galion Iron Works & Mfg. Co., Galion, Ohio.

Getting Specified Density In Granular Bases and Fills

188. Vibratory compactors offer the means for getting specified density in rock, slag, soil-bound macadam, gravel and sand base courses. Just one pass may suffice. Get complete information from Jackson Vibrators, Inc., Ludington, Mich. See how adaptable compactor units handle a variety of compaction needs. Check the reply card today.

Snow Plows for Tractors, Graders and Jeeps

207. An attractive four-page bulletin issued by Wm. Bros. Boiler and Mfg. Co., Road Machinery Div., 1057 Tenth Ave., S.E., Minneapolis 14, Minn. describes rotary snow plows that are for the front-end loader mounted models for wheel-type tractors and jeeps. Complete specifications are given and also the cutting withs. For your copy check the reply sard.

Traffic Paints That Last a Long Time

274. Traffic paints with the Parlon-Pentalyn formula, that has long wear, dries quickly, has excellent adhesion, provides an excellent bond for glass beads and can be applied by flow or spray is described in a bulletin just released by Cellulose Products Dept., Hercules Powder Co., Wilmington 99, Del. Check the reply card today for your copy.

How to Solve the Brush Disposal Problem

277. Fitchburg Chippers, engineered to solve the brush disposal problem reduce troublesome brush and trimmings to tiny, easy to-dispose-of chips. Several models are available to meet your needs. May be mounted on truck body or on trailer, tractor or jeep. Full details in interesting, profusely illustrated 16 page bulletin. Write Fitchburg Engineering Corp., Fitchburg, Mass., or check the reply card for your copy.

How Motor Graders Beat the Snow Problem

307. The power and directional control of Austin-Western Four-Wheel Drive, Four-Wheel Steer Power Graders are a combination that beats the toughest plowing combination. Get data on plow and snow loader attachments for graders from Austin-Western Works, Baldwin-Lima-Hamilton Corp., Aurora, Ill. Check the reply card.

Announcing an efficient new mower designed for public works jobs.

NOW--a light, economical city cousin to the famous Servis heavy-duty farm cutters.

SEE THE *Servis*

SC-80 MOWER

AT THE

PUBLIC WORKS EQUIPMENT SHOW

IN FORT WORTH, SEPTEMBER 23-26, AT LEONARD'S FARM STORE BOOTH

Inexpensive, economical to operate — geared to take minimum power — the new Servis SC-80 Rotary Pull-Type Mower is ideal for mowing parkways, landing fields, vacant lots, parks, and right of ways. Cuts grass, weeds, stalks, and brush up to 1" in diameter. (Our heavy-duty Gyro Cutters chop 3" trees!)

Tractor PTO transmitted to two sets of horizontal blades by belt drives. Cuts 80" swath.

Can be offset up to 32" outside rear tractor wheel without extra parts. Permits mowing right up to buildings, fences, curbs, and other obstacles. Mower wheels may be placed to provide 20" lateral overhang of blades on both sides for mowing freeway islands, close to curbs, etc.

SEND FOR NAME OF YOUR DEALER

Servis
EQUIPMENT CO.
DALLAS, TEXAS

Servis Equipment Company Dept. PW
1000 Singleton Blvd.
Dallas, Texas

Please send me information on.....

Name.....

Address.....

City..... State.....

Type Tractor Owned.....

To order these helpful booklets check the reply card inside front cover.

ON THIS LIST OF 26 SURFACES:

air compressors, air diffusers and piping, air ducts, bridges, brine tanks, chlorine tanks, clarifiers, cranes, fences, floor stands, handrails, equipment housings, I beams, pipes, pressure filters, reservoirs, stand pipes, steel trusses, valve stands, valves, water storage tanks, windows, doors, zeolite tanks.

YOU CAN SAVE UP TO ⅓ PAINTING COST WITH

ACB PRIMER

ACB Primer is a rust-preventing undercoat with remarkable durability. ACB Primer dries fast, dries hard, bars moisture penetration, stops rust. Used with Tropical Rhinamel or Elastikote finish coats you have an unbeatable combination that resists chemicals, fumes and moisture. Users report painting cost savings of up to HALF on new work, a THIRD on repaint work. Send for free ACB bulletin!

FREE! Survey shows better painting systems for Water and Sewage Plants

On-the-job studies by plant maintenance men and paint experts, condensed to a group of highly practical painting systems. Show best methods to defeat paint-destroying chemicals, fumes, mildew and excessive humidity on 267 types of equipment and surfaces above and below water. Simplify painting, save money. Sent free on your letterhead request — write today!

TROPICAL PAINT COMPANY, 1174-1238 W. 70TH ST., CLEVELAND 2, OHIO

Tractors and Equipment for Municipal Use

407. Specifications for the John Deere "40" crawler and "40" utility wheel tractors, together with equipment for loading, dozing, mowing, sweeping and many other operations is covered in a comprehensive illustrated catalog issued by John Deere, Dept. 66B, Moline, Ill. Get your copy by checking the reply card.

Valuable Information On Aerial Surveys

437. What you should know about aerial surveys is described in detail in the latest literature just released by Alster and Associates, 6135 Kansas Ave., Northeast, Washington 11, D. C. Topographic maps, mosaics and planimetric maps by aerial photograph are fully illustrated. For more information check the reply card.

Power Shovel, Crane and Backhoe All in One Unit

441. A completely hydraulic backhoe, shovel loader and crane all in one unit is described in literature available from the Badger Machine Co, Winona, Minn. Also information on front-end loaders, truck and trailer mounted hydraulic backhoes and various attachments that are useful for contractors, municipal and county engineers and state highway engineers. Check the reply card.

Information on Trucks for Every Job

442. Literature on the complete IHC truck line is available from International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill. Included is information on basic models, conventional and COE, 4-wheel, 6-wheel and four-wheel-drive. Check the reply card.

Literature on a Tailgate Loader

479. Information is now available on a safe, easy to operate tailgate loader. The loader is easy to install, light in weight and will lift a platform load of 600 lbs. It will fit most any standard pick-up or service utility body truck. Check the reply card or write to Midwest Body and Mfg. Div., Electrographic Corp., Paris, Illinois for your literature.

Information on 5 Versatile Tractors For Municipal and County Work

484. Tractors that find scores of highly efficient applications in construction, municipalities, utilities and related fields are described fully in a catalog just released by Massey-Harris-Ferguson, Inc., Industrial Div., Quality Ave., Racine, Wisc. Models, specifications, attachments and uses are covered. For your catalog check the reply card.

IHC Crawler Tractors For Highway Construction

491. Information on the new International TD-6, TD-9, TD-14 and TD-18 diesel crawler tractors is contained in 8-page, 2-color booklets available from Consumer Relations Dept., International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill. Mechanical features and specifications, engine power, and operation are fully covered. Check the reply card.

Blade For Tractor Makes Efficient Earth Mover

497. Literature on a rear mounted blade that fits most makes of light tractors is described in literature available from Danuser Machine Co., 533 East 3rd St., Fulton, Mo. Rugged construction makes this heavy-duty tool fine for landscaping, grading, ditching, scraping and backfilling. For full details check the reply card.

•

RECREATION

How to Equip Your Parks and Playgrounds

414. A handsome 60-page illustrated catalog showing a full line of extra heavy duty playground, pack-picnic and dressing room equipment, plus many related items, is now available from American Playground Device Co., Anderson, Ind. Complete specifications, construction features, prices and details of labor and materials needed for installation are included. Check the reply card.

TO THE ENDS OF THE EARTH...

From Canada to South Africa—
from the Pacific Ocean to the Near East—
Lock Joint Concrete Pressure Pipe
continues unfailingly to bring life-giving water
to cities, farms and industries.

Engineers and water works officials
of many countries have shopped the world and, like
so many of their fellow experts in the United States,
have chosen Lock Joint Concrete Pressure Pipe
as the most durable, dependable and
economical medium for the construction of their
vital water supply and distribution lines.

You cannot do better than to follow their example
and specify LOCK JOINT.

LOCK JOINT PIPE CO.

East Orange, New Jersey

Sales Offices: Chicago, Ill. • Columbia, S. C. • Denver, Col. • Detroit, Mich. • Hartford, Conn. • Kansas City, Mo.

Pressure • Water • Sewer • REINFORCED CONCRETE PIPE • Culvert • Subaqueous

goes *anywhere*

the

F&P

Portable

CHLORINATOR

Here's the answer to emergency or field construction chlorination—the Fischer & Porter *portable* chlorinator.

Readily moved by man or boy, it is a reliable stand-by chlorinator; anywhere, anytime. Can be conveniently transported by automobile, by airplane, or on foot to locations inaccessible to vehicles. Contractors find it indispensable for disinfecting new and old pipelines, municipalities use it for standby plant operation, emergency flood or field chlorination.

Employs the same rugged construction and safe, efficient, positive instrument-type controls used so successfully in the larger F&P chlorinators. Fully enclosed in tough, light Fiberglas cabinet, the entire unit is impervious to corrosion. Weighs less than forty pounds. Write today for complete information.

- SAFETY—built-in positive acting safety devices.
- SIMPLICITY—does not require highly skilled personnel to operate.
- MAINTENANCE-FREE—constructed entirely of materials inert to corrosion by dry or wet chlorine.
- WIDE RANGE—standard 10 to 1 overlapping flow ranges from 0.1 to 1000 PPD chlorine.
- EASY TO CHANGE CAPACITY—Converts to higher or lower flow ranges in minutes without special tools.

FP **FISCHER & PORTER**

596 Fischer Road, Hatboro, Pa.

In Canada:
Fischer & Porter (Canada) Ltd.
Toronto 15, Ont.

LA 1189

BOOKS IN BRIEF

FOUNDATION ENGINEERING

Dealing with practical foundation problems and their solution, the author covers a wide field of examples in modern practice for the solution of foundation problems of all kinds. Plenty of photographs are used to show actual construction operations; also included are special line drawings to illustrate and amplify explanations. The author is Rolt Hammond. Published by Philosophical Library, Inc., 15 East 40th St., New York 16, N. Y. Price $10.

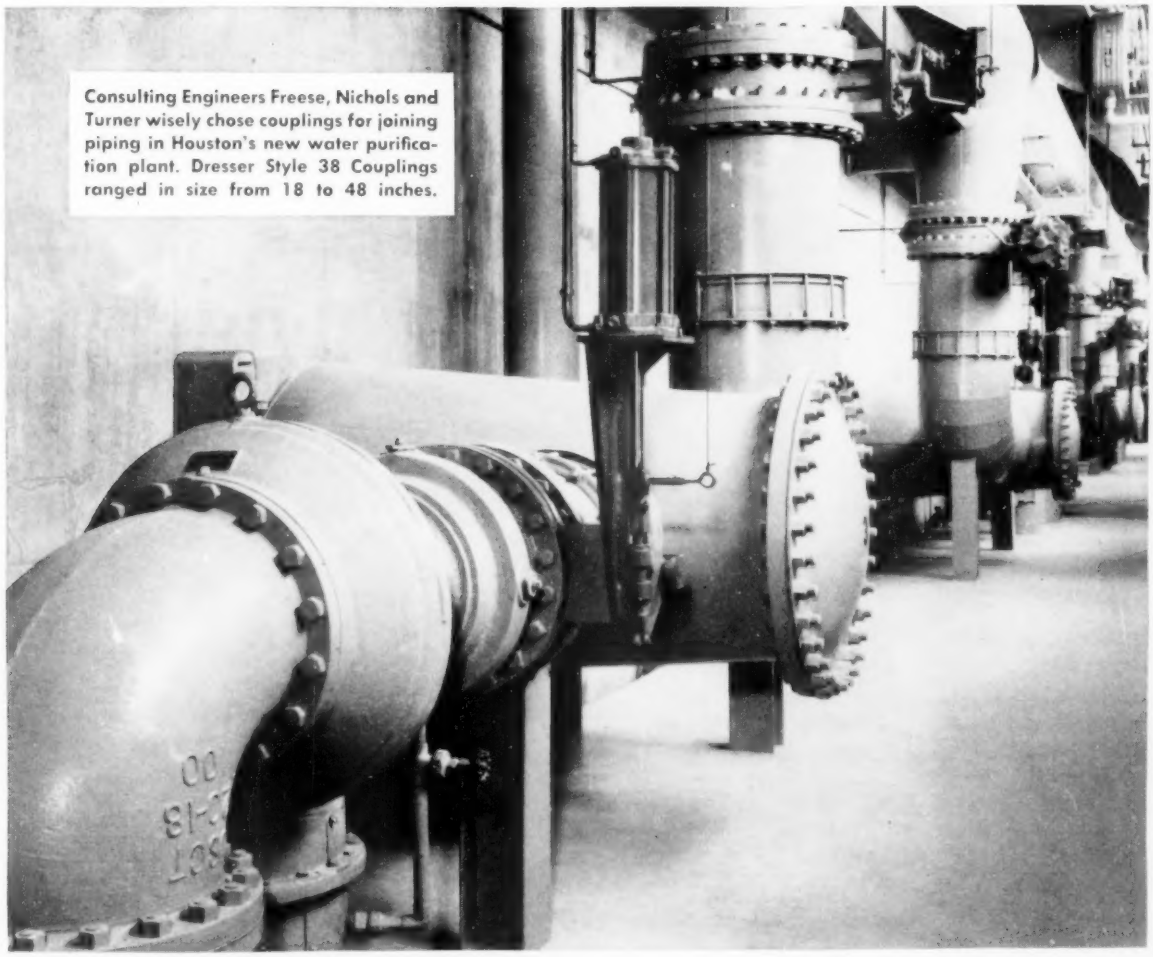
FOUNDATIONS DESIGN AND PRACTICE

This book begins with elementary material and then goes on to give the do's and dont's of successful foundation design and practice. Broad in scope, it covers such topics as under-pinning; foundations for pavements, dams and bridge abutments; applied soil mechanics; structural design data; and a building code practice. Included also is cathodic protection for steel structures in salt water. Throughout the volume, hundreds of worked-out drawings clarify the text material. The author is Elwyn E. Seelye. The publishers are John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price per copy $16.

INSTRUMENTS AND METHODS FOR SURVEYS OF LIMITED EXTENT

Covering the fundamentals of surveying and those basic surveying procedures that make up the great bulk of surveying practice, this book provides the best possible first course for civil engineers, geological engineers, geologists, architects and landscape architects. Theory and basic principles are stressed throughout; exact and complete derivations are used, and the principles are rigidly defined and illustrated. The author is Philip Kissam; publishers are McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y. Cost per copy $5.75.

MORE BOOKS ON PAGE 200



Consulting Engineers Freese, Nichols and Turner wisely chose couplings for joining piping in Houston's new water purification plant. Dresser Style 38 Couplings ranged in size from 18 to 48 inches.

Houston solves piping problems for good

Steel pipe and Dresser Couplings provide flexible installation, easy accessibility

Houston's new water purification plant, a part of the San Jacinto River Water Project, integrates some of the latest developments in industrial design with time-proved principles of municipal water treatment.

The new plant reflects the wise use of steel pipe and mechanical couplings where weight, price and greater flexibility are important factors.

Consulting Engineers Freese, Nichols and Turner of Houston specified Dresser Couplings teamed with steel pipe "to provide for expansion and contraction of long runs of pipe, to provide for flexibility in the installation and possible future dismantling of large pipe assemblies, and to connect steel pipe to concrete hydraulic structures."

Whenever you join pipe — especially near valves or any type of mechanical installation — provide easier installation and permanence with safe, sure Dresser Couplings.

Regardless of vibration or expansion-contraction, the resilient gaskets in Dresser Couplings hold bottle-tight for life. This built-in flexibility, particularly important between rigid flanges, serves to prevent piping strain from reaching valve casings and working parts. Result: greater efficiency, longer life.

Installation with Dresser Couplings requires only a wrench, is fast and simple. You can forget time-consuming procedures because Dresser Couplings compensate for slight misalignments, facilitate installation of set, rigid equipment on piping. These couplings also permit easy entrance into lines for maintenance or repair of equipment.

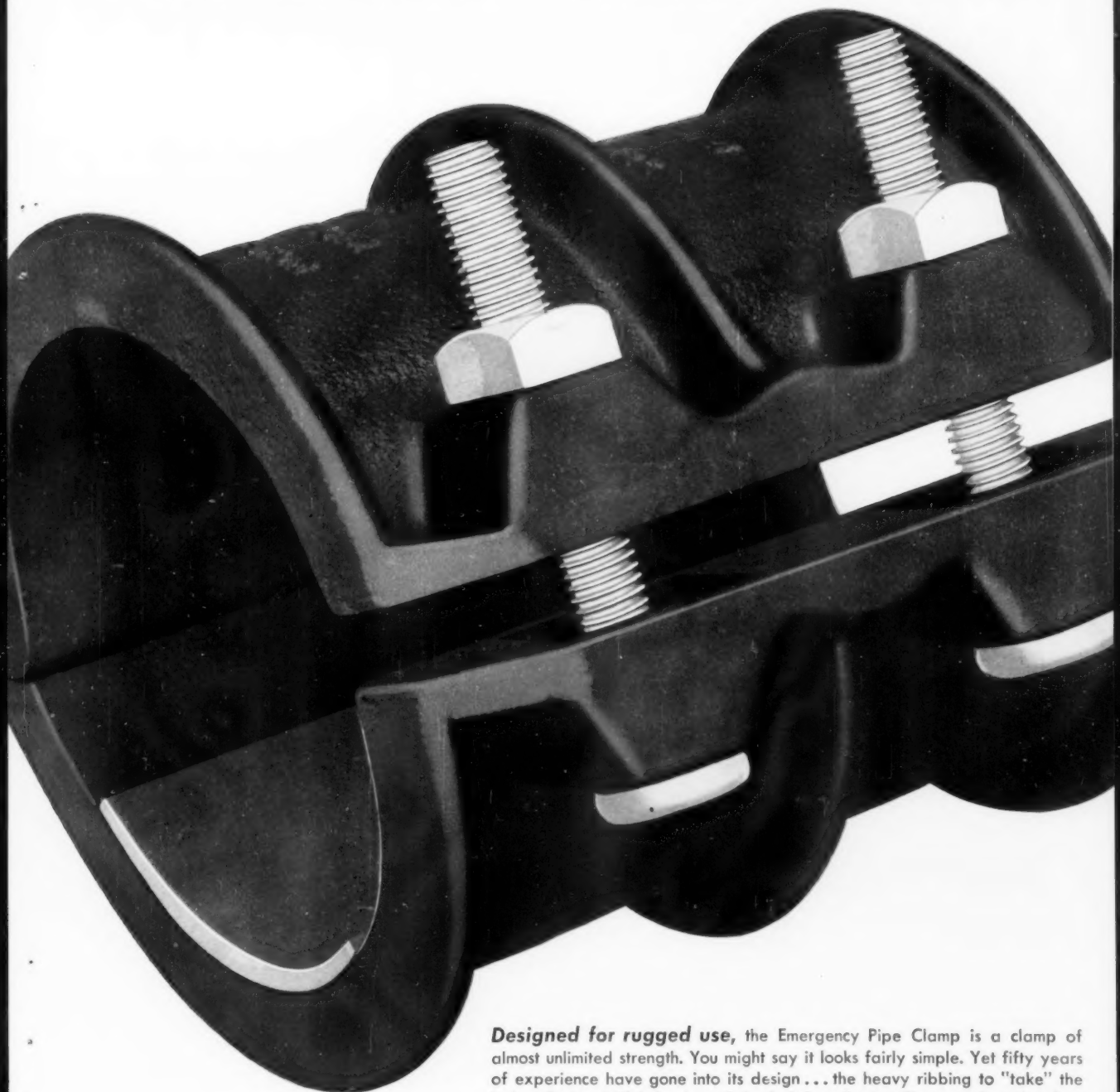
No other method of pipe joining provides all these proved advantages. Make sure you have foolproof, leakproof Dresser Couplings on your next water, sewerage or industrial project. For complete information, call your local piping supply house or write Dresser Manufacturing Division, Bradford, Pa. Sales offices in: New York, Philadelphia, Chicago, S. San Francisco, Houston, Denver, Toronto and Calgary.

ONE OF THE DRESSER INDUSTRIES

nothing Magnifies your Peace of Mind...

like Complete Dependability

THE CLAMP WITH GUTS!



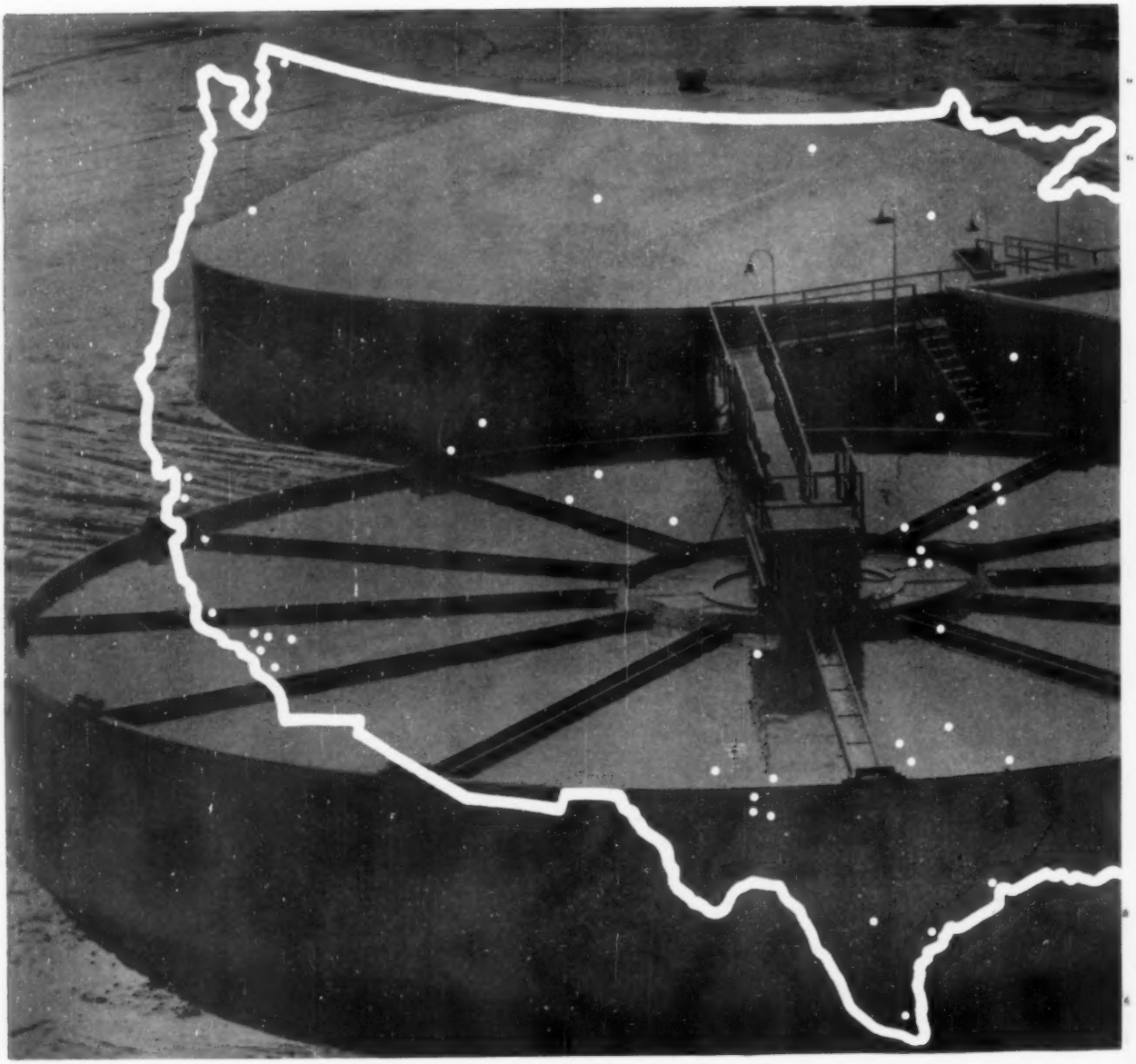
Designed for rugged use, the Emergency Pipe Clamp is a clamp of almost unlimited strength. You might say it looks fairly simple. Yet fifty years of experience have gone into its design . . . the heavy ribbing to "take" the bolt-pull, the skillful shaping of the bolt lugs for terrific strength and a free wrench swing. The full length, massive hinge which no strain can loosen! The over-thickness of metal throughout to make child's play of any pressure! The glove-like fit . . . result of shaping each clamp over an accurate mandrel, pulling it down with a 12,000 pound air vice and sledging to complete snugness.

When you put on the Emergency Pipe Clamp, it is there to stay. Tens of thousands of them are still in place after 20, 30, 40 years' service. Made in C.I. and steel pipe sizes—½″ to 12″ inclusive.

Write for Catalog GW
M.B. SKINNER CO., South Bend 21, Ind.

SKINNER-SEAL **EMERGENCY PIPE CLAMP**

NATIONWIDE HIGH-RATE

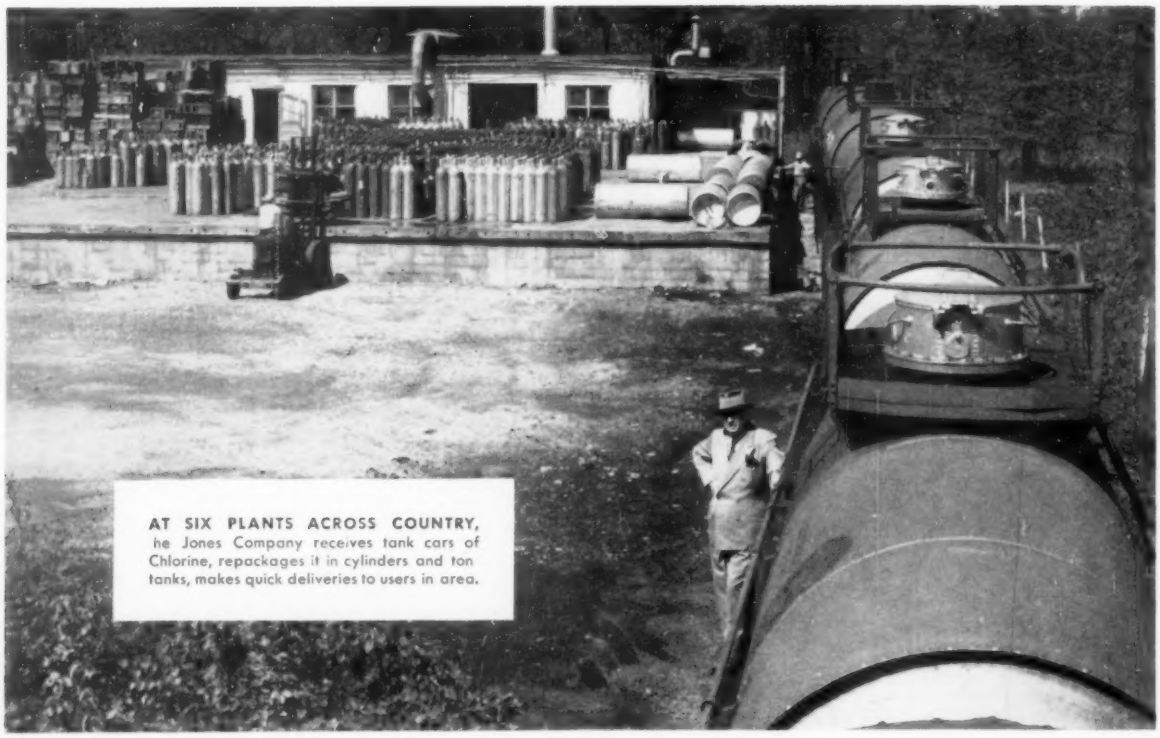


with the GRAVER

WATER TREATMENT

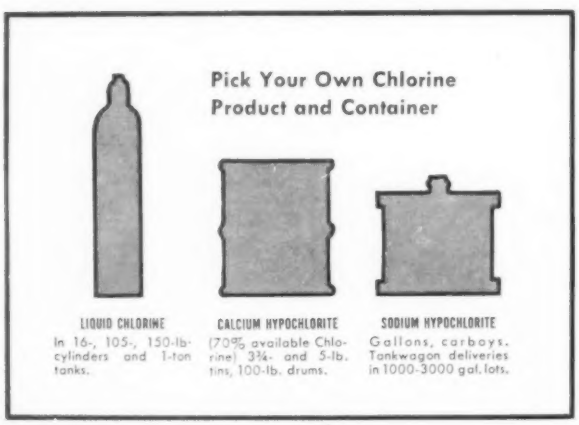
WRITE FOR Bulletin WC-103A
and several informative technical articles which describe the distinctive design features of this cold process water softener and clarifier.
a complete line of water treatment equipment
Municipal Dept.: M-211
GRAVER WATER CONDITIONING CO.
Division of Graver Tank & Mfg. Co., Inc.
216 West 14th Street, New York 11, N. Y.
GRAVER

REACTIVATOR®!



AT SIX PLANTS ACROSS COUNTRY, he Jones Company receives tank cars of Chlorine, repackages it in cylinders and ton tanks, makes quick deliveries to users in area.

CHLORINE: Fast delivery on less-than-carload lots


Pick Your Own Chlorine Product and Container
LIQUID CHLORINE
In 16-, 105-, 150-lb. cylinders and 1-ton tanks.
CALCIUM HYPOCHLORITE
(70% available Chlorine) 3¼- and 5-lb. tins, 100-lb. drums.
SODIUM HYPOCHLORITE
Gallons, carboys. Tankwagon deliveries in 1000-3000 gal. lots.

You get swift delivery—and NO storage worries—when you turn your Chlorine problem over to John Wiley Jones Company. Six plants, strategically located across the U.S., stand ready to supply you.

Order shipments as small as a 16-lb. cylinder of liquid Chlorine, and as large as you want. With this flexibility, you eliminate storage problems. We supply more municipalities than all other Chlorine packers combined.

Quality is exceptional—meets high government standards!

Our trained technical staff will be glad to help you solve your Chlorine problem. Write for prices.

JOHN WILEY JONES CO.

100 Sunny Sol Blvd.
Caledonia, New York
Tele—Caledonia 84, 79, 4

1904 Border Ave.
Torrance, Calif.
Tele—Fairfax 8-6383

600 Bethel Ave.
Beech Grove
(Indianapolis), Ind.
Tele—
Idlewood 1443, 1444

2365 Dennis St.
Jacksonville, Fla.
Tele—Elgin 4-5503
6-3321

610 McNinch St.
Charlotte, N. C.
Tele—6-7790

14400 N.E. 20th Lane
North Miami, Fla.
Tele—North Dade 6-6288
or Dial 81-6-6288

Parlon® Stays On

Protects Municipal Swimming Pools

PARLON ON CONCRETE—Since the City of Omaha opened this municipal pool in 1950 it has been kept looking its Sunday Best all season long by RAMUC, a Parlon-based protective coating manufactured by Inertol Co., Inc., Newark, N. J. Omaha's general foreman of maintenance credits this finish with keeping this concrete pool attractive while holding down maintenance and operating costs.

Whether the pool is steel or concrete, municipal maintenance departments heads throughout the nation have found that they can depend on a Parlon-based finish for longer-lasting beauty at lower long-term cost.

Already familiar with the unique chemical and corrosive resistance qualities of Parlon-based coatings for many other municipal uses, these men have found that special Parlon formulations provide the colorful finish they want for pools combined with under-water wearing properties that mean less maintenance cost.

Wherever protective coatings must meet a challenge, whether it be interior or exterior, masonry, wood or metal, look to Parlon for the ideal all-purpose maintenance paint. Your local paint supplier can provide additional information, or write direct to Hercules.

PARLON ON STEEL—This steel pool, too, is painted with RAMUC. Its tile-like finish has withstood the attack of water and water-treatment chemicals without peeling or powdering.

Cellulose Products Department
HERCULES POWDER COMPANY
INCORPORATED
978 King Street, Wilmington 99, Del.

CR56-5

PARLON CHLORINATED RUBBER PAINTS ARE AVAILABLE FROM 400 MANUFACTURERS UNDER THEIR OWN BRAND NAMES

who wants them???

No one! . . . Least of all city managers and sewage plant superintendents.

The psychological impact of odor is completely out of proportion to its importance as a health hazard. But TRY TO CONVINCE AN IRATE CITIZENRY of this fact. THE SIMPLE SOLUTION IS BIONETIC.

Odor Fundamentals:

The accumulation of grease and sludge is the principal cause of collection system odor nuisance. These accumulations provide food and shelter to odor producing organisms. Poor digestion at the plant is another major source of odor. Unwanted odor is developed both during digestion and while sludge is drying.

The Remedy:

Bionetic will remedy the principal causes of odor production. Bionetic applied on the collection system does not require high cost feeding equipment or constant supervision and removes sludge and grease economically. Aplication of Bionetic will produce a longer residual action than either masking agents or germicidal chemicals. Plant applications of BIONETIC to digesters, wet wells and trickling filters is equally as simple. BIONETIC IS COMPLETELY HARMLESS to humans or equipment.

Experience:

Hundreds of cities and industries, both here and abroad are now benefiting from their use of BIONETIC. LET BIONETIC HELP YOU. Many simple, economical BIONETIC solutions to waste treatment problems are on file.

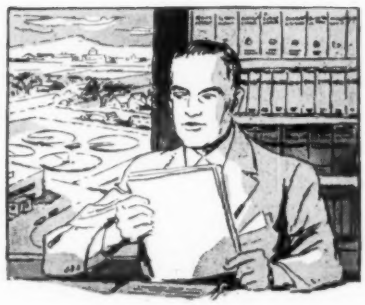
WRITE FOR FREE BULLETINS AND REPRINTS.

Reliance Chemicals Corporation
Bionetic Division

P. O. Box 6724 Houston 5, Texas

**Reg. TM. Reliance Chemicals Corp. Applies only to a specific method of manufacture of preserved cultures of beneficial micro-organisms of uniform potency that are field tested in waste treatment plants.*

LEGAL ASPECTS OF PUBLIC WORKS



MELVIN NORD,

Dr. Eng. Sci., LL. B.

Registered Professional Engineer

The Wright and Wrong of It

Sweat and Wright were partners in the construction business. Sweat was also a member of the City commission . . . . From here on, the plot thickens in *Watson v. City of New Smyrna Beach*, 85 So. (2d) 5[illegible] (Florida, March 5, 1956).

At a meeting of the City commission, Sweat offered a motion that bids be invited for alteration and extension of the City's power plant. The motion was unanimously carried.

At the time designated in the notice, three bids were received, the lowest one being from the partnership of "Sweat and Wright." One of the City commissioners challenged their bid because one of the partners was a member of the commission. The City attorney advised that the bid be rejected because of a provision in the Charter, which was done. The other two bids were also rejected, because they were not accompanied by the required bond or certified check.

New bids were invited. The lowest bid was rejected because the bond had not been obtained from a local agent, as required. The next lowest bid was by a Mr. Phillip L. Wright, who happened to be one of the partners in the firm of Sweat and Wright.

The contract was let to Wright, but Watson (a taxpayer) claimed this was wrong. He brought a taxpayer's suit to have the contract declared void on the ground that it violated the charter, which forbids "self-dealing." The City answered that Wright took the contract in his own name, and that Sweat had no interest in it.

The court said, "We will assume that the men involved are of the highest character—nothing to the contrary appears in the record." Nevertheless, and despite the fact that the commission was well aware of the relationship, the contract was held void. As the court said, "Honest as may have been the motives of all concerned, mischief could result from such a situation, if not in this case, certainly in cases to follow were it to become a precedent."

Presumably someone else has by now done the construction work at a higher price, but the City's honor has been saved.

Elementary, my dear Watson.

Out of the Frying Pan

McAfee v. State of New York, 149 N.Y. Supp. (2d) 547 (March 7, 1956) presents an unusual fact situation, besides telling us how not to cook.

On April 17, 1953, William B. McAfee and his wife decided to have a fish dinner. Mrs. McAfee placed a frying pan with about a pound of lard in it on an electric stove for some french fries, and turned on the burner to heat the lard. The stove was located in the kitchen immediately below wooden cupboards. . .

Now, go on with the story.

About five minutes later, Mr. and Mrs. McAfee left in their car to buy ready-cooked fish at "Bill's Inn", about 20 blocks away. Upon returning home, they found the wooden cupboards over the stove were on fire, and burning upward into the ceiling. Mrs. McAfee says she remembers having turned the switch to control the heat under the lard, but doesn't know whether she turned it off or turned it to a higher position. In any event, the fat was in the fire, and the (Volunteer) fire department was immediately called.

The Village postmaster, who was also a Captain in the Fire Department, drove the fire truck from the fire station the *long way* to the McAfee's house. He made no stops; neither did he make a speed record. It seems the fire truck was of a

If your community isn't on this list...

YOU CAN CUT THE COST OF REFUSE COLLECTION!

THESE COMMUNITIES DEPEND ON ROTO—PAC

New York City
Chicago
Philadelphia
Jersey City
Rochester, N. Y.
Atlanta, Ga.
Youngstown, Ohio
Bridgeport, Conn.
Everett, Mass.
Easton, Pa.
Newark, N. J.
Detroit, Mich.
Pawtucket, R. I.
Manchester, N. H.
Montreal, Canada
Paris, France
Caracas, Venezuela
San Juan, P. R.
San Luis Potosi, Mexico

only **ROTO-PAC** provides true economy

Yes, you can cut the cost of your refuse collection by using ROTO-PAC. Automatic continuous loading and automatic continuous packing, coupled with greater compaction mean that ROTO-PAC provides maximum tonnage per load, more loads per day. The cost per ton and per cubic yard is cut to the minimum.

And that's not all. The low loading height of the ROTO-PAC means easier, faster loading. Double pivot type telescopic body hoists speed dumping. Both of these features adds up to more loads per day.

ROTO-PAC assures low operating costs too. It operates on the lowest operating pressure — for less engine wear. Its sturdy construction will stand up to the roughest, day-to-day use. And ROTO-PAC doubles as a snow-hauling vehicle, too.

There's still more to the ROTO-PAC story, but the best way to prove its value to your community is with a demonstration. If you want to save money for your community, now is the time to take a closer look at your refuse collection. Use the convenient coupon below.

see our exhibit at the **APWA CONVENTION**
FORT WORTH, TEXAS – BOOTHS B-18-19-20, A-56

There's a wealth of valuable facts in our new brochure B-96. Send for your copy today.

CITY TANK CORP.
53-09 97th Place, Corona, N. Y.
Sales and Service in All Principal Cities

CITY TANK CORP.
53-09 97th Place, Corona, N. Y.

I want more facts on cutting the cost of refuse collection in my community.

☐ Please arrange a demonstration
☐ Please send your brochure

Name_____

Title_____

Address_____

..MAIL THIS

COUPON TODAY

for

Free BOOKLET

"THE MODERN APPROACH TO THE BRUSH PROBLEM"

TELLS HOW YOU CAN—

cut Loading and Hauling Costs
—1 truckload of chips equals at least 4 of brush

eliminate Brush Burning
—a boost to your public relations

provide Chips, a valuable by-product
—use them for mulching, shrub beds, erosion control, walks, and cushion material in playground areas

Demonstration easily arranged at your convenience, without obligation

ASPLUNDH CHIPPER COMPANY (Dept. W)
505 York Road Jenkintown, Pa.

Please send me FREE BOOKLET, *The Modern Approach to the Brush Problem*

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

BY ACTUAL TEST THE FASTEST CHIPPER MADE

somewhat unusual construction. In the midde of the underside of the truck, valves and a pump drain projected downward, and on the rear was a low-hanging step. On previous occasions, the Postmaster-Fire Captain had driven the fire truck across Lindbergh Road (which is the direct way to the McAfee's house), but had found that the valves and pump drain dragged because of a drop-off at an intersection. So this time he took a slight detour, onto Route 11, to avoid the dragging. As a result he lost the race with the fire, and the McAfees lost most of their house.

The McAfees sued the State of New York for failure to keep the highway maintained properly, thereby causing the fire truck to make a detour, thereby causing their house to burn down. The Court, however, found no liability on the State, because of the State's immunity.

Which just proves that an ounce of prevention is better than a pound of lard.

Estoppel Street

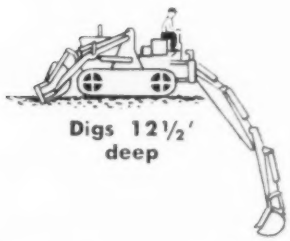
In City of Houston v. Hughes, 284 S.W. (2d) 249, a Texas case decided Nov. 9, 1955, Hughes sought to recover title to and possession of a strip of land on which the City had constructed a road.

When Hughes decided to subdivide and sell parts of his land to individuals it was necessary for him to establish a roadway. He said he intended this to be a private right of way for the prospective purchasers, giving them an outlet to the nearby public streets. At one time, he put up a sign "private street", but it did not stay up very long. No effort was made to prevent the general public from using the roadway, and the public did use it.

The City has now purchased all the land adjacent to this roadway, but Hughes still claimed he had title to the roadway. The court held, however, that it was a public road, having been dedicated to public use. The fact that it had not originally been laid out or maintained by the city did not prevent it from being a public road. The court said: "When once a way, street, etc., has been laid out on the soil, or on a map, and property has been purchased in reference thereto, the resumption of the street or way by the proprietor would be an act of bad faith and a fraud upon any interests acquired upon the faith of its being left open. Hence it operates as an estoppel . . . of the owner from . . . any use which is inconsistent with the public use to which it has been dedicated."

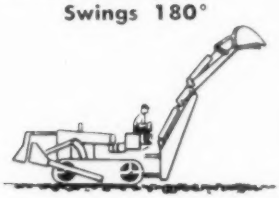
Compare TerraTrac's 12 exclusive features before you buy any backhoe!

Reaches 18′



Digs 12½′ deep

Swings 180°



Dumps 13′ high

One look at TerraTrac's husky welded steel box-section boom and dipper stick tells you this rugged crawler-mounted backhoe is *really built for heavy-duty trenching and excavating.* It reaches further, digs deeper, dumps higher, has a wider swing-angle than any other tractor-hoe in its price range. But that's not all. This new TerraTrac unit also has *far more power and speed for tough digging.*

Big 50 HP industrial engine with torque-converter drive, plus 30 GPM hydraulic pump...bigger boom and dipper cylinders...*exclusive foot-pedal swing control*... really make the dirt fly. In addition, 1482 sq. in. of track on the ground, combined with individually controlled stabilizers lets you work in soft or rough terrain where rubber-tired rigs can't go...gives you *much better stability and balance,* so you can dig tough materials without danger of being pulled into the hole.

Even more important, the COMPLETE TerraTrac unit — tractor, backhoe, and front-end loader or dozer — is *designed, built and fully warranted by ONE manufacturer* — is available with handy low-cost tilt-trailer for fast job-to-job moves. Sound interesting? Use coupon for quick action.

CLIP . . . MAIL FOR FREE CATALOG

TERRATRAC®

. . . Performance leader in medium-size crawler tractors and equipment

American Tractor Corp., Box 659, Ft. Wayne, Ind.

☐ Send free catalog on new TerraTrac Backhoe
☐ Have nearest dealer representative call

Name ..... Position .....

Company .....

Address .....

City ..... State .....

TT-B-98

Transite Pressure Pipe assures dependable service through the years

ENGINEERS and city officials face much the same problem in pipe selection. It is twofold: (1) How to make sure the community gets many long years of trouble-free performance from its pressure mains, and (2) How to do this as economically as possible by choosing pipe for durability plus savings.

Transite® Pressure Pipe is solving this problem in hundreds of municipalities and water districts from coast to coast. Here's why. An asbestos-cement product, strong and durable and highly resistant to corrosion, it has effected economies in installation as well as operation.

For example, the community benefits even at the very outset, since both handling and assembly of Transite Pressure Pipe are so simple that crews can install as fast as trench is opened. This means lower installed costs.

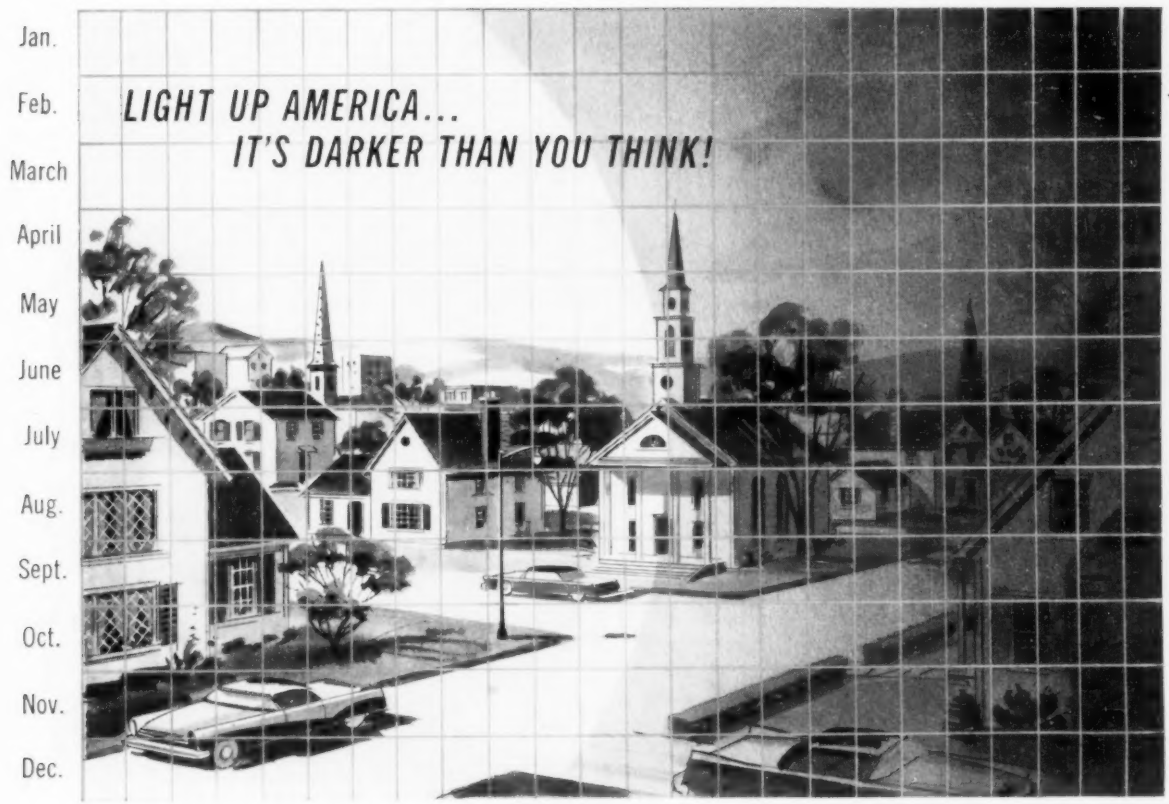
Another Transite Pipe characteristic instantly recognized by engineers as of major importance is its smooth interior that stays smooth. This provides maintained high flow capacity. (Flow coefficient is C-140.)

* * *

For further information about Transite Pressure Pipe with the Ring-Tite® Coupling, write for Booklet TR-160A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, Port Credit, Ontario.

JM PRODUCTS

Johns-Manville TRANSITE PRESSURE PIPE
WITH THE RING-TITE® COUPLING



How does your town plan to combat darkness?

In five out of six communities, shopping and residential streets which are pleasant and inviting in the daytime become dark and unattractive when night falls. "Horse and buggy" lighting cuts down the hours of business, reduces social activity, keeps away visitors, and sets the stage for juvenile delinquency, crime, and accidents.

That's why hundreds of civic leaders across the nation are sponsoring good lighting in their towns. Adequate street lighting has already proved that its benefits far outweigh its moderate cost. Brightly lighted shopping streets act as a magnet, pulling buyers from miles around. Community life is quickened when streets are safe for pedestrians and drivers. Crime is reduced. Nighttime accidents are fewer.

People know that the well-lighted town is a progressive town—a good place to live and to establish business and industry. Why not find out how much good lighting can do for your community?

"Out of Darkness," a new, dramatic film story of how one community met its street-lighting problems, is now available to civic groups, community service organizations, etc. This 16-mm, sound, black-and-white movie runs 26 minutes. Borrow a print of "Out of Darkness" from your nearest G-E Apparatus Sales Office.

Section B 455-12
Outdoor Lighting Department,
General Electric Company, Schenectady 5, N. Y.

Please send me a free copy of the 24-page bulletin, "Light the Way to a Better Community," GEA-6047.

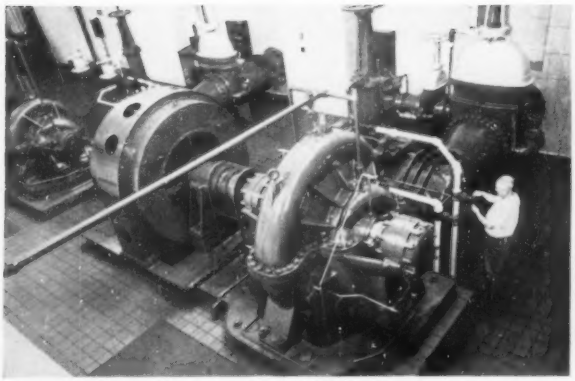
Name_____

Street_____

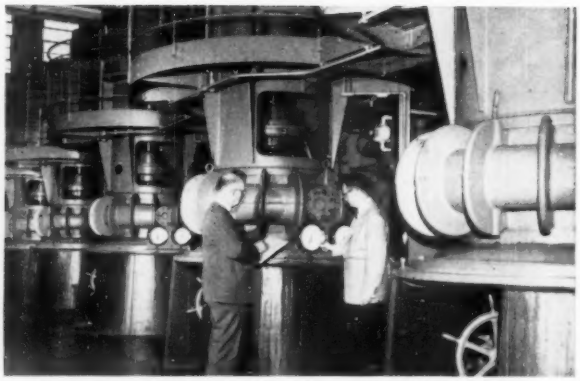
City and State_____

Progress Is Our Most Important Product

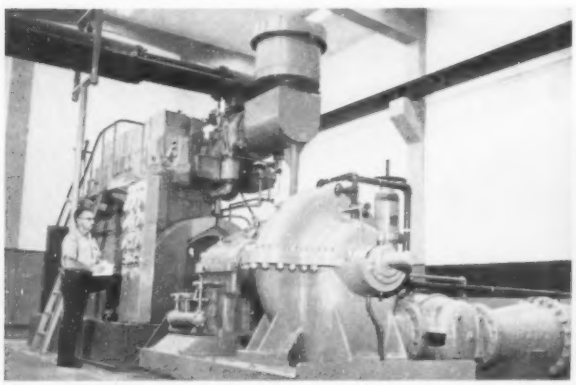
GENERAL ELECTRIC



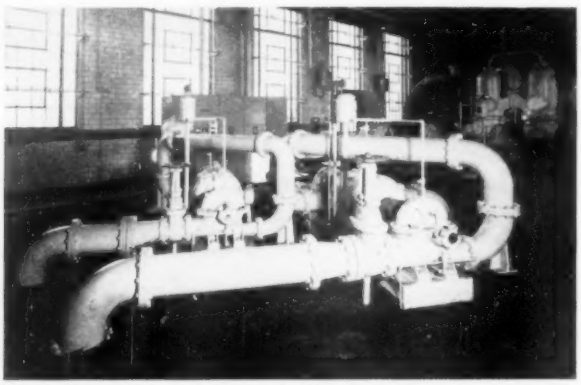
PHILADELPHIA, PA. One of ten Worthington high lift centrifugal pumps at the Torresdale Pumping Station. Capacity of this pump is 40 MGD.



NIAGARA FALLS, N. Y. Worthington high lift pumps in the Water Filtration Plant. In all, there are ten Worthington pumps, 15 to 30 MGD each.



MIAMI, FLA. One of four Worthington 15 MGD pumps driven by a Worthington diesel engine at the new Alexander Orr, Jr., Water Treatment Plant.



SHARON, PA. Two Worthington two-stage centrifugal pumps at the Sharon Valley Water Company. Capacity of the units is 2 MGD and 4 MGD each.

Reliability proved a thousand times a day

You benefit 3 ways when you deal with Worthington—world's leading builder of water works equipment

High output and low costs. Literally thousands of municipalities from the smallest to the largest have found that they get high volume output and low operating costs when they install water works equipment by Worthington. Every day, the reliability of this equipment is thoroughly proved in installations like those pictured here.

An unbiased recommendation. Because Worthington makes all types of pumps and drives, you get the advantage of an equipment recommendation based on a broad look at all available ways of doing the job. Trained specialists will help you analyze your requirements and select the proper equipment.

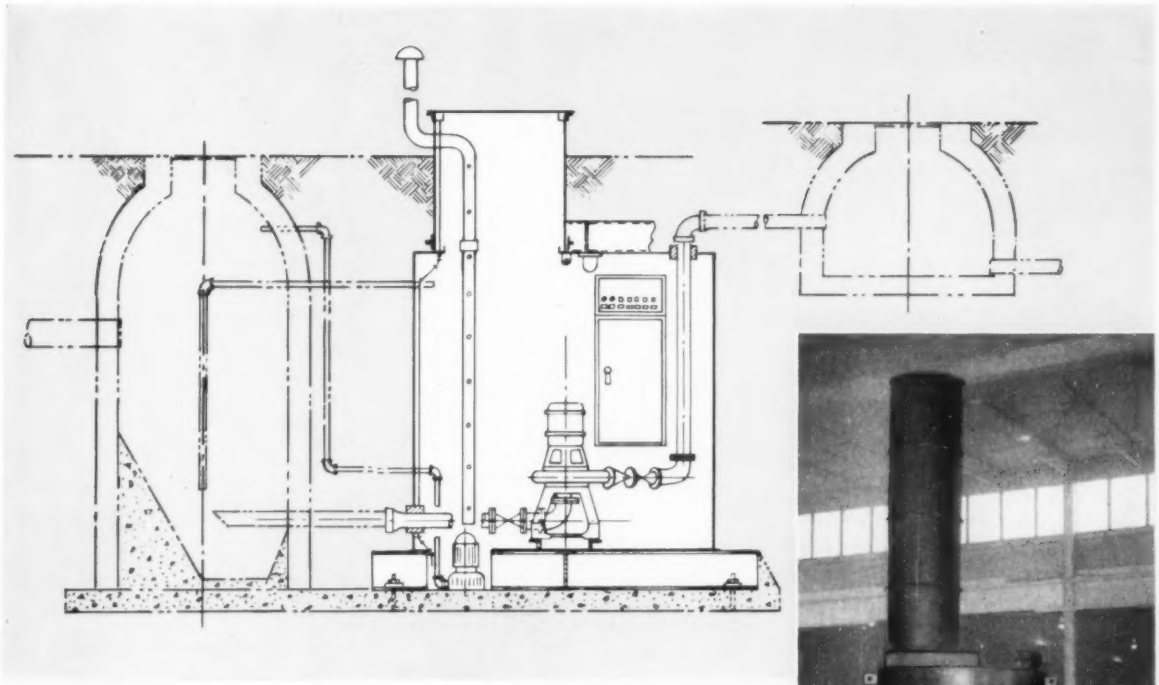
Unit responsibility. You do business with one company—eliminating delays and inconvenience that can occur when you are forced to co-ordinate the efforts of several suppliers. Unit responsibility by Worthington saves you time and money.

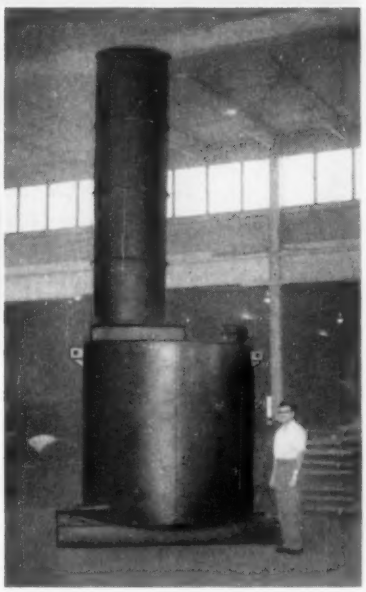
Some of the water works equipment built by Worthington include: horizontal and vertical centrifugal pumps; vertical turbine pumps; diesel, gas and dual fuel engines; steam turbines; speed increasing gears; and water meters.

For more information on any of these products, call your nearest Worthington District Office, or write Section W66, Worthington Corporation, Public Works Department, Harrison, N. J. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont. W-6-6

WORTHINGTON

ALL MAJOR PUBLIC WORKS EQUIPMENT UNDER ONE RESPONSIBILITY





Schmieg AUTOMATIC UNDERGROUND PUMPING STATIONS

Complete Package Units . . . Pre-Fabricated . . . to Overcome High Installation and Operating Costs.

Public works officials everywhere are faced with ever-increasing demands on their pumping station equipment. Rapid growth of residential and industrial areas is creating acute problems in sewage and water drainage.

Schmieg now offers an Automatic Underground Pumping Station, expertly engineered, using the best quality mechanical and electrical components. The units are completely assembled for quick, economical installation and years of trouble-free operation.

After permanent assembly and factory testing, the unit is shipped to the installation site and connected (usually in one day) to new or existing lines.

Schmieg Automatic Underground Pumping Stations offer these advantages: 1. Properly designed discharge piping to allow free flow when both pumps operate. 2. Generous access space between pumps. 3. Accessable sump pump location. 4. Heavy industrial type conduit for entrance wiring. 5. Heavy duty durable Yale lock on door. 6. Double welded pump chamber. 7. Services of a superintendent to start equipment.

If you have sewage or water drainage problems, write for full particulars or ask to have a Schmieg engineer to call.

- LOW COST INSTALLATION
- MINIMUM MAINTENANCE
- FACTORY TESTED
- PREWIRED
- COMPLETE PACKAGE UNIT
- CORROSION PROTECTED

Plans for Schmieg Automatic Underground Pumping Stations have been favorably reviewed by state health and sanitation departments.

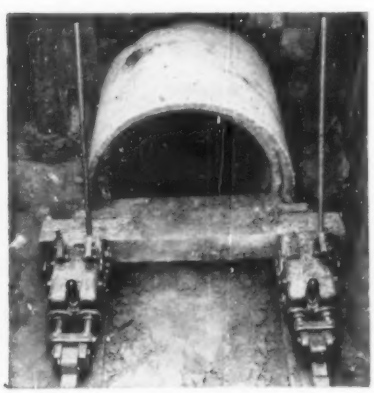
Exclusive Territories Now Available to Qualified Representatives

Schmieg INDUSTRIES, Incorporated
PUMPING STATION DIVISION
DETROIT, MICH.—P.O. Address: 23930 Sherwood, Center Line, Mich.

FAST, EASY WAY
TO INSTALL PIPE...
AT LOWER COST

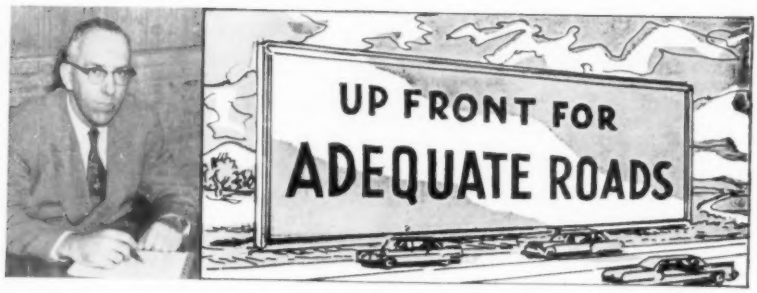
PUSH PIPE UNDERGROUND WITH
A GREENLEE HYDRAULIC PUSHER

Here's the simple, cost-cutting way to install underground pipe. Speed your jobs with a GREENLEE Pusher. One-man-operated, portable, simple to operate. No tearing up of pavement . . . eliminates extensive ditching, tunneling, backfilling, tamping, repaving. Cuts job time to a fraction. GREENLEE Hydraulic Pipe Pusher often pays for itself on first job. Two sizes — model shown above for pushing 3/4" to 4" pipe. Larger unit, below, for pipe over 4", concrete sewer pipe and large drainage ducts. Power pump (as shown above) also available for extra ease and speed of operation.



GREENLEE

Write today for descriptive literature. Greenlee Tool Co., 2049 Columbia Avenue, Rockford, Ill., U.S.A.



by LEO J. RITTER, JR.
Highway Consultant

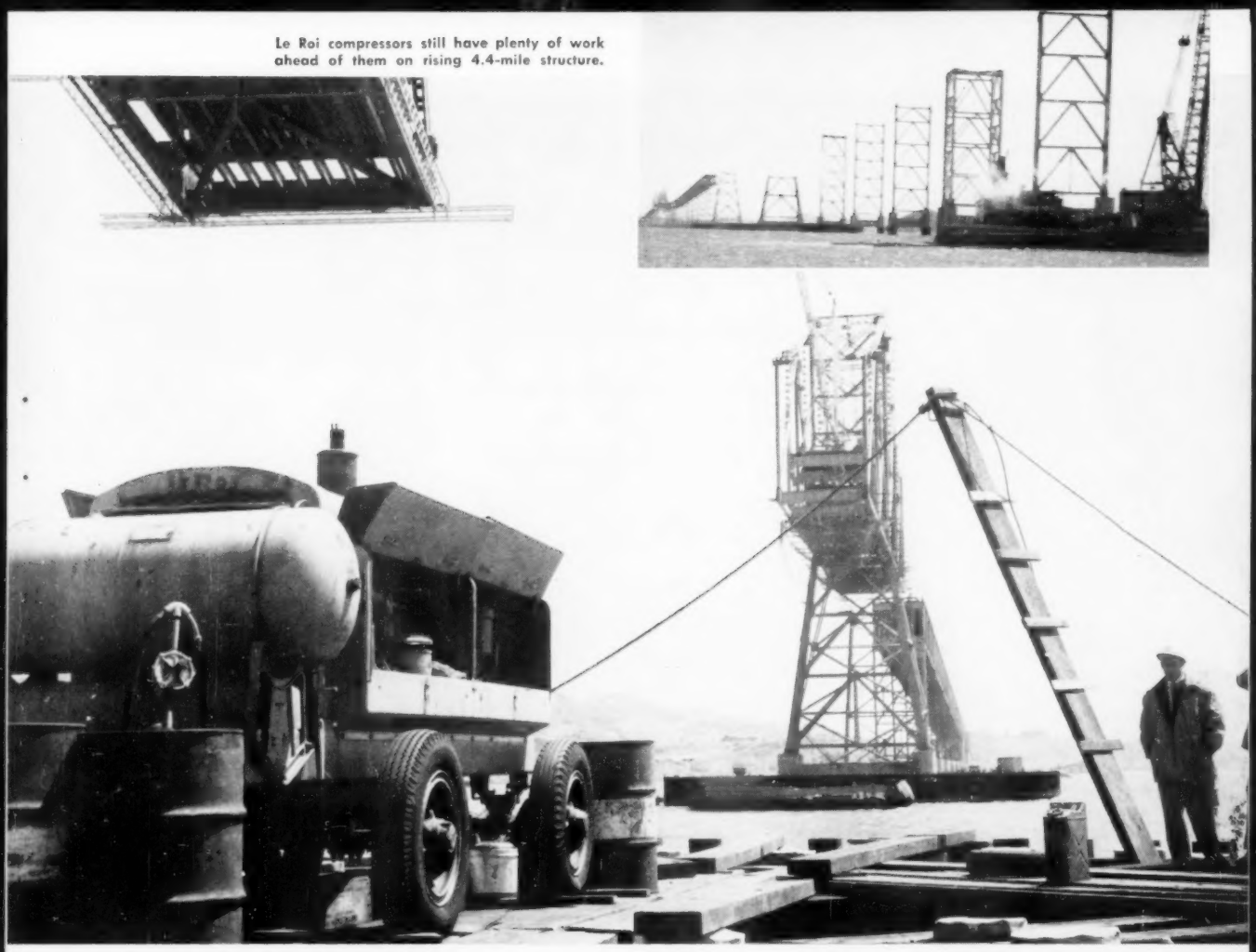
Reflection Cracking—Our recent query about methods used in sealing reflection cracks in bituminous concrete overlays of old portland cement concrete pavements evoked an interesting letter from E. W. Bauman, Managing Director of the National Slag Association. Mr. Bauman points out two methods which have been used successfully as measures to prevent the occurrence of this type of cracking in bituminous resurfacing. One of these is the use of a rolled base course of crushed slag between the existing pavement and the new surface—3 or 4 inches of slag are commonly used. This method has been in use by the New York State Department of Public Works and other agencies for some time. Another method is that of subsealing the concrete pavement with hot asphalt before construction of the new surface. This procedure is now being used in resurfacing of some sections of the Pennsylvania Turnpike. Along similar lines, the Highway Research Board has recently released Bulletin No. 123, which is entitled "Bituminous Resurfacing", and contains four papers given at the 34th annual meeting in January, 1955 (yes, 1955). Among the papers is one by Bone and Crump of MIT, reporting on methods of controlling reflection cracking—preventive measures which these investigators believed held the greatest possibilities for further studies included granular base courses, wire mesh reinforcing, and the use of thin metal plates over joints and cracks in the existing pavement. ARBA bulletin No. 215, also of recent issue, contains descriptions of successful uses of welded wire fabric at Willow Run Airport (Detroit) and in the District of Columbia. Certainly any one of these methods, or a combination of them, will prevent reflection cracking. However, what about the reflection cracks that exist now? How do you seal them? We incline toward V-grooving the crack, cleaning it out thoroughly, and filling it with hot-poured, rubber-bearing sealing compound. What do you think?

Jackpot—Your writer hit the jackpot when he received a copy of the booklet entitled "Location and Evaluation of Gravel Sources for Highway Use", used in the series of short courses given by Cornell University this spring. James W. Spencer and Olin K. Dart, Jr. have done a terrific job of writing and illustrating a very practical treatment of this extremely important subject. I'm sure that Jim has no intention of going into the publishing business, but you might be able to get a copy by writing to James W. Spencer, Department of Agricultural Engineering, Cornell University, Ithaca, New York. Notice we said "might" be able to get one.

Trouble, Trouble, Trouble—The crane people, we imagine, aren't very happy about a proposal by the Borough of Manhattan to prohibit the travel of mobile cranes on their streets, except in cases of absolute necessity to prevent hardship. A spokesman for one of the groups affected pointed out that enforcement of such a ban would force a return to construction methods used "in the building of the pyramids." Undoubtedly somebody is also unhappy over the recent collapse of a 180-foot crane boom used on a building construction project in Manhattan; we reported the use of that unit not long ago.

Vacationeering—We really don't suppose that you care too much about our vacation travels and this is certainly not a travel column, but: This time we found two more wonderful spots, both of which we recommend highly. One of these is the lake area of northern Wisconsin, around Woodruff and Lac du Flambeau—beautiful country and fine swimming, boating and fishing. The other is the Keweenaw Peninsula in Upper Michigan, the copper country

Le Roi compressors still have plenty of work ahead of them on rising 4.4-mile structure.



Sea-Going Air Power Helps Assemble 4.4-mile Bridge

Air compressors are located at hard-to-get-at pilings

Some working more than two miles from land

Nearly a dozen Le Roi Airmaster compressors provide dependable power for air tools to speed steel assembly

Choppy waves and swirling currents tug at the pilings that support nearly a dozen Le Roi compressors. Gusty winds howl through the steel work high above the whitecaps. Yet progress is unhampered on the new $62 million 4.4-mile bridge across San Francisco Bay.

Dependability and easy starting of prime importance. The 600-cfm Le Roi compressors placed out in the bay provide air power for air tools used on steel assembly work along the 21,343-foot span. It's difficult to reach these units for servicing — yet reliable, uninterrupted performance is essential. That's why Le Roi compressors were selected. Exposed to driving, moisture-laden winds and piercing salt spray, these easy-starting, trouble-free air compressors keep plenty of air power moving through the hose. Further proof of the popularity of Le Roi compressors in the "Bay" area is found in the fact that Clementina Ltd. uses a fleet of 120 Le Roi's for rental purposes.

A new method of handling long trusses was developed. Because of the high winds and tricky tidal currents, a set of 280-foot aluminum-alloy supporting spans was built which allowed on-site erection of the permanent steel spans.

Second largest bridge. Contractors on this new bridge to link Richmond and San Rafael, California are Judson Pacific, Murphy, Kiewit. The huge 4.4-mile span is surpassed only by the famed San Francisco Bay Bridge. Highest tower on this new structure rises 325 feet above the water.

Use Le Roi air power on all your jobs for reliable performance under all conditions. See your Le Roi distributor today.

LE ROI Division of Westinghouse Air Brake Co., Milwaukee 1, Wisconsin, manufacturers of Cleveland air tools, Tractair, portable and stationary air compressors, and heavy-duty industrial engines. Write us for information on any of these products.

C-165

JACKSON VIBRATORY COMPACTORS

TERRIFIC TIME SAVERS ON ALL THESE APPLICATIONS:

BACKFILL TAMPING

BLACKTOP PAVEMENT PATCHING

The manually guided Jackson Vibratory Compactor delivers up to 4200 2-ton blows per minute, is self-propelling and will compact bituminous mixes in 5" layers close to maximum density at the rate of 1800 sq. ft. per hour. Operated from a power plant mounted on an auto trailer with device for quickly picking up and lowering the compactor, this is positively the most advantageous outfit ever offered for patching blacktop pavement, paving drives, walks and similar applications.

It's equally efficient in compacting granular soils in bridge approaches, water, sewer and gas mains and laterals, sub-bases of pavement widening projects, sub-bases of concrete floors, in trenches (interchangeable bases from 12" to 26" available), and dozens of similar applications. 100% of specified density is readily achieved in 10" layers. The Power Plant is fully capable of operating two of these compactors simultaneously and in many instances labor costs can be cut in two by use of the twin-unit shown at right.

CAMPACTING IN TRENCHES, ETC.

MACADAM CONSTRUCTION

For consolidating base courses of rock, slag, gravel and sand in waterbound and penetration macadam construction the Jackson Multiple Compactor is indeed outstanding. It is used on practically all of the important paving jobs in the nation. By all means write for the complete facts.

TWIN UNIT ▲
DOUBLES PRODUCTION

JACKSON
VIBRATORS, INC.
LUDINGTON, MICH.

—and if you really want to get away from it all, try Eagle Harbor or Copper Harbor; beautiful sea and landscapes, fascinating history, and very few of the "annoyances" of modern living. Roads—excellent to good to poor, with a lot of construction work going on. In northern Wisconsin, at least, there is an excellent system of paved and gravelled secondary roads, both state and county. Main highways are, in general, quite adequate, although few of them are suited to high-speed travel. There are some graveled sections of U. S. numbered highways in Upper Michigan, the first of that category we had been on in a long time. Most miserable driving was in the Porcupine Mountains State Park in Michigan, on extremely dusty gravel roads; there's an ideal spot for you chloride people to do some real missionary work. Wierdest part of the trip was some 20 miles over a dirt road hunting for a ghost town called Nonesuch (Michigan); the place really lived up to its name. Crossed the new, million-dollar bridge, just recently dedicated, across the Wisconsin River at Wisconsin Dells. It is a beautiful structure, although we are inclined to agree with Frank Lloyd Wright, who offered to design one at a different location free of charge and termed the present location a concession to the "peanut and popcorn trade".

Airport Program—Federal aid funds for airports have been allocated for the 1957 fiscal year by the CAA. The list includes 368 projects which will receive about $52 million in federal funds, out of an available $63 million for this fiscal year. The country's principal aviation centers will receive the largest individual grants. Grants of $1,250,000 each will be made for improvements at Atlanta, Chicago (O'Hara), Los Angeles (International), Miami, Minneapolis-St. Paul, New Orleans, New York (International); and Oakland; grants of $1,000,000 will go to Detroit (Wayne) and Nashville; 260 of the projects which will receive federal aid are for general aviation airports and smaller airline stops; these will receive 30% of the allocated federal funds. The allocations are a part of the largest federal aid airport program in history, the four-year program authorized last year.

Traffic— The July issue of *Traffic Quarterly*, which is published by the Eno Foundation, Saugatuck, Connecticut, contains several interesting articles on traffic and transportation. One of them is entitled "The

How Ford Tractor versatility speeds work, cuts costs on municipal jobs...

Ford Tractor power stretches tax-dollars because it helps get more jobs done faster, and at lower cost!

For example, a Ford Tractor equipped with backhoe is a fast, efficient rig for digging service line trenches, bell holes and utility connections. *And you can use the same tractor* with front-mounted hydraulic angle dozer to backfill, doze, rough grade. Or, take a Ford Tractor equipped with new Ford "Step-On" Loader. You can lift and load up to 1000 pounds at the touch of a lever. *And you can use the same tractor* with quick-attached rear blade for finish grading, road maintenance, oil mixing and ditching . . . with a rear-mounted rotary cutter for mowing . . . with a reversible scoop for hauling fill on small yardage jobs.

This Ford concept of 4-wheel tractor versatility means that your equipment dollars work harder on more jobs, more days in the year. Ask your Ford Tractor and Equipment dealer to demonstrate the power size you need—Ford's 600 series with 29 drawbar h.p., the fuel-thrifty Fordson Major Diesel with 36.3 drawbar h.p., or an 800 series Ford Tractor with over 40 horsepower at the drawbar! See your dealer soon, or write direct to:

Ford TRACTORS

TRACTOR AND IMPLEMENT DIVISION
FORD MOTOR COMPANY
Birmingham, Michigan

INSTANT BRUSH DISPOSAL
FITCHBURG CHIPPER
DOES 3 MEN'S WORK

Charles Merriss feeds roadside brush into Mahwah's Fitchburg Chipper

When you want to cut brush disposal cost, investigate a Fitchburg Chipper, a real time and labor-saver.

John Glasgow, Superintendent of Public Works, Township of Mahwah, New Jersey, says: "Now I chip brush instead of putting it on piles and waiting for wet weather to burn. I mention wet weather because of fire hazard.

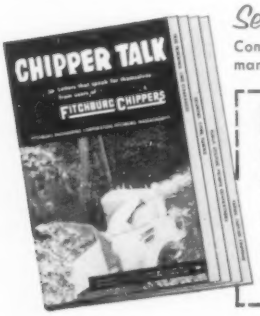
"The Fitchburg Chipper was purchased in May 1954. It will take only a short time to pay for itself. I hired 6 men to cut and clean up brush, now with the Chipper I only need 3 to do the same work."

You, too, can save man hours where there is a need for line clearance operations, road clearance, thinning out woodlots, or handling the brush problem on parkways, city streets, etc.

The Fitchburg Chipper is designed for rugged use, and in models priced from $960 upward.

Learn about Fitchburg's exclusive spring-activated feed plate, which makes chipping of all sizes of wood (up to the machine's rated capacity) simple. Another exclusive feature is the hinged feed apron which can be closed when not in operation.

Read how others cut labor costs with a Fitchburg Chipper—the only chipper that gives you a one-year guarantee.



Send For New Free Booklet - **"CHIPPER TALK"**

Complete cutaway color drawings and photo copies of letters from many municipalities, commissions, counties, contractors, tree care men.

FITCHBURG ENGINEERING CORPORATION

Department PW-96 Fitchburg, Massachusetts

Send my free copy of *"Chipper Talk"* to:

Name_____ Position_____

Address_____

Town or City_____ State_____

Influence of Expressways", by W. J. Mortimer, who is Superintendent of Highways for Cook County (Chicago), Illinois. The article presents a careful analysis of some aspects and characteristics of traffic on the Edens and Congress Street Expressways, with particular regard to traffic generation and assignment. Among the conclusions of the report, "The traffic on expressways (Edens and Congress Street) is primarily accounted for by diversion from parallel alternate routes."

In Manhattan, the one-way avenue system is to be broadened to eliminate any northbound traffic through Times Square; Broadway and Seventh Avenues (which adjoin) are to carry southbound traffic and will be flanked by northbound travel on Eighth Avenue and the Avenue of the Americas (Sixth Avenue). The Department of Traffic of the City of New York reports that substantial progress is being made in its plan for the development of peripheral parking lots in various locations. Several of the "park and take the subway" lots will be in operation in the near future.

From Here and There—Ben T. Collier has been reappointed to the position of State Aid road engineer of Mississippi for another 2-year term; Ben has been doing an excellent job in this position since 1950. A 6½-mile extension of the Calumet Expressway in Cook County, Illinois has been opened to traffic; the expressway was designed by the Cook County highway department. Fred J. Benson, Professor of Civil Engineering and Director of the Texas Transportation Institute, has been appointed Vice-Director of the Texas Engineering Experiment Station. Barber-Greene has announced a new low-cost, high-capacity, mixing pugmill designed especially for use in soil stabilization. Grants for highway engineering scholarships at five schools have been sponsored by Socony Mobil Oil Co. Two new buildings—Structural Development Laboratory and Fire Research Center—are to be built by the Portland Cement Association at their R & D Center in Skokie, Illinois.

• • •

Portsmouth Has Used Landfill for Nine Years

Claiming to be the third city in the country to use a land-fill, Portsmouth, O., now employs an Allis-Chalmers HD-11G tractor shovel for operating the fill. An area of 22 acres of river bottom land is being filled, using the trench method.

200,000,000 Feet In Service Today!

ORANGEBURG®

ROOT-PROOF PIPE

Over 200,000,000 feet of Orangeburg Pipe are in service today from Maine to California. Its recorded use in sewage disposal work dates back to 1906.

Orangeburg's root-proof joints and its resistance to corrosion make the pipe particularly adaptable for house sewers and other underground non-pressure uses.

Through its record in actual service, Orangeburg has gained acceptance by leading approving authorities, architects, engineers, plumbers and builders.

Outstanding quality is the big reason. Orangeburg is strong, tough, resilient... withstands traffic tensions...temperature changes. Resists acids and alkalies in ground waters and sewage wastes... lasts for years underground.

Orangeburg makes quick work of installation. Light 8-foot lengths are easy to handle. Taperweld Joints seal root-proof without cement or compounds.

Orangeburg also comes *Perforated* for foundation drains, septic tank filter fields ... all subsurface seepage drainage.

Easy to Install
No Cement — No Caulking
No Compound

The famous Orangeburg Taperweld joint seals root-proof and watertight with a few hammer taps. Long, 8-foot lengths are light, easy to handle, to grade, to install. Orangeburg saves trouble and money. Complete line of fittings simplify installation.

UNDERGROUND 50 YEARS

ADVERTISED IN LIFE

see our catalog in Sweet's or write for copy

ORANGEBURG MANUFACTURING CO., INC.
ORANGEBURG, N. Y. NEWARK, CALIF.

ORANGEBURG MANUFACTURING CO., INC.
ORANGEBURG, N. Y. Dept. FW-56

Send Engineers' independent report on Orangeburg Pipe for sewage disposal.

Name_____

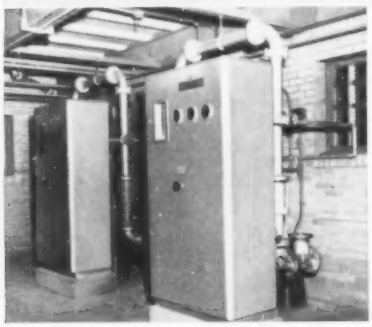
Address_____

City_____ State_____

Go Modern Underground, ... With ORANGEBURG® ROOT-PROOF PIPE AND FITTINGS

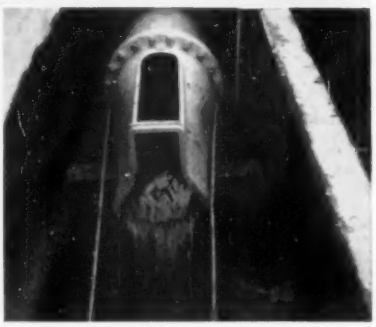
METERS and CONTROLS

engineered specifically for sewage and waste plants . . . proven in thousands of installations

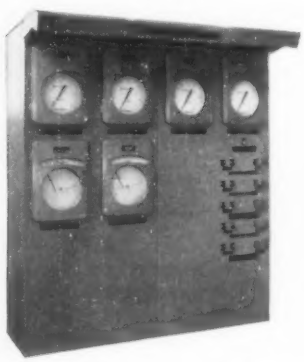


Builders Model HCVS Visible Flow Chlorinizers — capacity 100 to 8000 lbs. per 24 hrs. each — installed at Bucklin Point Sewage Treatment Plant, East Providence, Rhode Island.

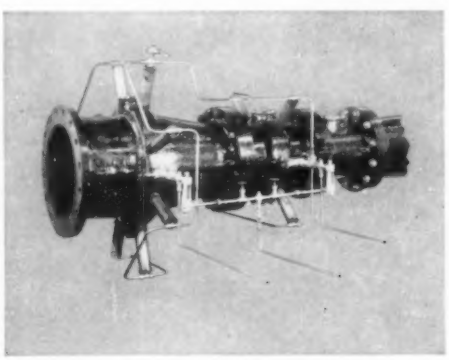
Builders Chronoflo Electric Receiver for remote totalizing, indicating, and recording of raw sewage flow at Mt. Vernon, Ohio, Sewage Plant.



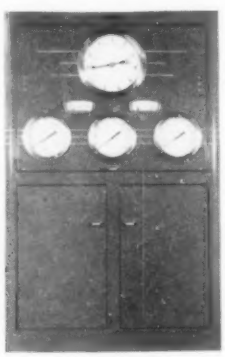
24" Kennison Nozzle, which, with Builders Type M Totalizer-Indicator-Recorder, meters sewage influent at Eslava Creek Sewage Disposal Plant, Mobile, Alabama.



Builders Master Control Panel at New Rochelle, N. Y., Sewage Treatment Plant.



Builders Venturi Tube with hydraulic operated vent cleaners and Flush Check System for trouble-free metering of sewage and sludge flows.



Builders Instrument Panel for Hyperion Sewage Treatment Plant at Los Angeles, Calif. . . . gauges indicate air/sewage ratio, return sludge/sewage ratio, aeration air, raw sewage, and return sludge.

BUILDERS offers a unique service to designers of sewage and waste treatment plants — a complete line of flow meters and controllers . . . from the primary measuring device in the pipe line to the metering instrument in the control panel. Builders line of Visible Flow Chlorinizers is geared to the chlorination needs of modern sewage and waste plants . . . four basic models covering the complete capacity range from 4 to 8000 lbs. per day . . . all easily adaptable to manual or automatic control systems. For Bulletins, write **Builders-Providence, Inc.,** 356 Harris Avenue, Providence 1, Rhode Island . . . division of

B-I-F INDUSTRIES

PROVIDENCE, RHODE ISLAND

B-I-F METERS FEEDERS CONTROLS

BUILDERS IRON FOUNDRY • PROPORTIONEERS, INC. • OMEGA MACHINE CO. • BUILDERS-PROVIDENCE, INC.

OBNOXIOUS ODORS QUICKLY VANISH with OZENE

(Formerly ORTHOSOLV*)

OZENE WORKS TWO WAYS

Ozene's effectiveness in controlling objectionable odors has been demonstrated in a variety of applications, ranging from sewage plants and land-fill refuse operations to industrial wastes. Ozene's two-way action masks odors and then attacks odor-causing conditions. It attacks and halts the development of bacteria responsible for unpleasant hydrogen sulfide odors. It also retards the growth of mold micro-organisms related to odor producing decomposition of garbage and waste materials.

WIDE RANGE OF USEFULNESS

Ozene has been used with eminent success in many applications all over the country by municipalities and industries.

These include:

Sewage Plants
New Excess-capacity Sewers
Drainage Ditches
Incinerators
Storm Sewers
Sewer Breaks
Sludge De-watering
Fish Market Areas
Land-fill Refuse Disposal
Refuse Cans and Trucks
Kennels
Rendering Plants
Paper Plants
Cheese, Cannery and other Food Plants

AMERICA'S FIRST PRODUCER OF ALKALIES — SOLVAY® — 75th YEAR 1881-1956

Aluminum Chloride • Vinyl Chloride
Potassium Carbonate • Calcium Chloride
Sodium Nitrite • Soda Ash • Snowflake® Crystals • Chlorine
Sodium Bicarbonate • Ammonium Chloride • Caustic Potash
Methylene Chloride • Monochlorobenzene • Ammonium Bicarbonate
Carbon Tetrachloride • Methyl Chloride • Cleaning Compounds • Caustic Soda
Para-dichlorobenzene • Ortho-dichlorobenzene • Hydrogen Peroxide • Chloroform

CONTROLS FLIES AND GREASE

Users of Ozene for odor control in sewage plants report important side benefits such as elimination of filter flies, and a sharp reduction in slime and grease deposits.

ECONOMICAL

A little Ozene goes a long way—as little as two quarts added directly to the lines has effectively eliminated odors from a daily flow of 450,000 gallons of sewage. It mixes with water and can be diluted as much as 100 to 1 for use as a spray.

*The trade-mark OZENE replaces that of ORTHOSOLV. The product itself remains the same—100% active ingredients for efficient, effective control of odors.

For test samples and additional data mail this coupon today

Allied Chemical

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

Gentlemen: Please send me WITHOUT COST†
( ) Test Samples
( ) Descriptive Literature

Name_____

Title_____ Affiliation_____

Address_____

City_____ Zone_____ State_____

EF-9

†In Western Hemisphere Countries Only.

Salt-Slush Corrosion is costly

Stop it with BANOX®

Salt is the easiest and least expensive method of snow and ice control for streets and roads. But salt-slush corrosion is hard on cars, bridges and municipal equipment. Now BANOX lets you have the benefits of safe, efficient salt without paying the penalty of corrosion damage.

BANOX COSTS LITTLE—SAVES MUCH. The use of as little as one pound of BANOX to every hundred pounds of salt . . . a few cents per capita per year . . . is enough to stop corrosion damage. BANOX is easy to use—needs no special mixing, and will not damage concrete, black-top or brick pavements.

Give your community the benefits of the low-cost* BANOX-salt team this winter. Many salt companies now supply ready-mixed BANOX and salt. Write for full information or ask for the free folder, "Stop, Look and Save with BANOX."

calgon, inc.

HAGAN BUILDING, PITTSBURGH 30, PENNA.

*Comparative cost figures for both city streets and highways indicate that you save as much as $4.27 per mile by using rock salt instead of abrasives.

Inexpensive . . . Only 1 lb. BANOX needed for every 100 lbs. of salt.

Easy to use . . . BANOX needs no special mixing, is evenly distributed by traffic.

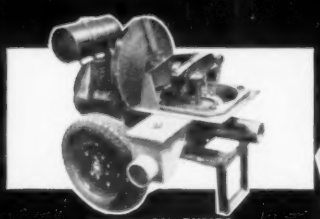
THE NATION'S No. 1 SOURCE

for dependable pipe line equipment

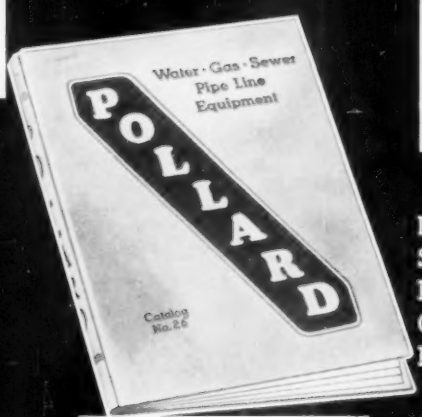
Like hundreds of Pollard customers, you'll find it mighty pleasant and convenient to order pipe line equipment from Pollard.

Here, under one roof and listed in one comprehensive catalog, are all the time and money saving products you need on the job. Each is guaranteed for dependability, economy. Each is backed by Pollard service.

JOINT RUNNERS



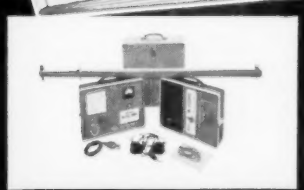
DIAPHRAGM PUMPS



MANHOLE CUSHION

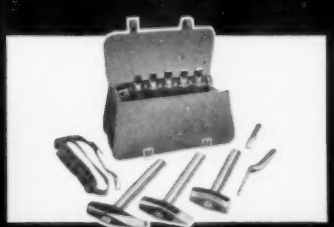
MAKE POLLARD YOUR SOURCE FOR PIPE LINE EQUIPMENT. ORDER FROM POLLARD CATALOG 26.

PIPE CUTTERS



M-SCOPE PIPE FINDER

MELTING FURNACE



CALKING TOOLS

PIPE LINE EQUIPMENT

JOSEPH G. POLLARD CO., INC.

PIPE LINE EQUIPMENT

PIPE LINE EQUIPMENT

Place your next order with POLLARD

If it's from POLLARD . . . It's the Best in Pipe Line Equipment

NEW HYDE PARK • NEW YORK

Branch Offices: 1064 Peoples Gas Building, Chicago, Illinois
333 Candler Building, Atlanta, Georgia

Mall

HAS THE CHAIN SAW TO SUIT YOUR POWER SOURCE

ELECTRIC

GASOLINE

PNEUMATIC

MALL high performance, lightweight electric chain saws plug in anywhere—operate on 115 volt current (230 or 220 volt models also available)—or from portable or truck mounted generators, of 1,000 volts and higher. Capacities 12" to 26". MALL pneumatic chain saws, suitable for all jobs from tree trimming to cutting huge pilings under water are available in capacities of 12" to 42". Operate from stationary or truck mounted compressors. MALL'S famous MG line of gasoline engine chain saws are self-contained power units needing no outside source . . . lightweight, portable and powerful. Capacities 12" to 72".

A complete line of

Gasoline Engine Portable Power Tools

- Generators
- Pumps
- Earth Augers
- Concrete Vibrators
- Chain Saws

MALL TOOL COMPANY Division of Remington Arms Company, Inc.

7737 South Chicago Ave., Chicago 19, Illinois

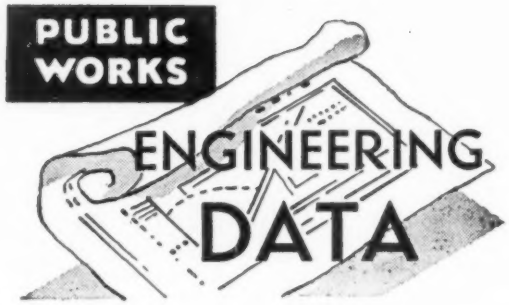
Send me the FREE Gasoline Engine Tool Catalog—send me also information about MALL Chain Saws for municipalities.

*Name*_____

*Title*_____

*Address*_____

*City*_____ *Zone*____ *State*_____ MU-U-223



DISTRIBUTION OF FEDERAL HIGHWAY FUNDS

(Tabulation of approximate state shares in millions of dollars)

(For Fiscal 1957, 1958, 1959)

STATE	Primary Highway System ($832.5)	Secondary or feeder roads ($555.0)	Urban Highways ($462.5)	Interstate System ($4700.0)	Total ($6550.0)
Alabama	17.4	13.5	6.1	95.4	132.4
Arizona	12.1	8.3	1.8	53.9	76.1
Arkansas	13.7	11.2	2.6	68.3	95.8
California	38.5	19.6	41.4	268.0	367.5
Colorado	15.2	10.1	3.9	64.2	93.4
Connecticut	5.5	2.8	9.0	45.3	62.6
Delaware	4.2	2.8	1.0	29.4	37.4
Florida	13.4	8.7	8.4	79.9	110.4
Georgia	20.3	15.6	6.7	109.5	152.1
Idaho	10.1	7.2	.9	47.5	65.7
Illinois	32.4	17.6	32.6	221.6	304.2
Indiana	19.6	13.5	11.1	114.3	158.5
Iowa	19.9	14.6	5.5	95.9	135.9
Kansas	19.6	13.7	4.4	85.3	123.0
Kentucky	15.4	12.9	4.8	88.2	121.3
Louisiana	13.1	9.5	6.8	77.6	107.0
Maine	7.0	4.9	1.9	37.8	51.6
Maryland	7.6	4.6	7.8	56.4	76.4
Massachusetts	10.9	4.1	19.4	100.3	134.7
Michigan	26.1	15.9	21.7	169.0	232.7
Minnesota	21.4	15.0	7.6	105.9	149.9
Mississippi	14.6	12.2	2.6	74.6	104.0
Missouri	23.9	16.1	11.5	127.3	178.8
Montana	16.7	11.6	1.1	67.5	96.9
Nebraska	16.4	11.6	2.8	67.4	98.2
Nevada	10.5	7.0	.4	49.1	67.0
New Hampshire	4.2	2.8	1.4	29.4	37.8
New Jersey	11.1	3.8	20.4	102.9	138.2
New Mexico	13.2	9.1	1.5	57.0	80.8
New York	39.9	16.0	62.2	333.2	451.3
North Carolina	20.7	17.8	6.0	119.8	164.3
North Dakota	11.8	8.5	.9	52.1	73.3
Ohio	29.3	17.8	26.9	201.2	275.2
Oklahoma	17.6	12.6	5.0	84.1	119.3
Oregon	13.9	9.8	3.7	63.9	91.3
Pennsylvania	33.9	20.2	35.3	251.9	341.3
Rhode Island	4.2	2.8	3.3	29.4	39.7
South Carolina	11.1	9.2	3.2	63.2	86.7
South Dakota	12.4	8.9	.9	54.5	76.7
Tennessee	18.0	14.1	6.7	100.6	139.4
Texas	53.5	35.9	22.3	270.1	381.8
Utah	9.4	6.3	1.9	45.8	63.4
Vermont	4.2	2.8	.6	29.4	37.0
Virginia	16.1	12.4	7.2	95.1	130.8
Washington	13.8	9.2	7.0	75.5	105.5

2 versatile BACK-HOE combinations

Wain·Roy BACK HOE and PAYLOADER Shovel

Keep both ends of your "PAYLOADER" profitably employed — digging trench, bell holes, etc. with the hoe — backfilling, excavating, material handling with the front end shovel. A complete, balanced unit that handles scores of jobs on paved or unpaved surfaces.

Hoe may be attached or removed in less than 30 minutes. Digs 18″ to 36″ trench, in 190° radius, down to 12′-6″. Special buckets available. Actuated bucket, powerful breakout force assure big yardage at all times. For details see your I-H Industrial Power Distributor or write direct.

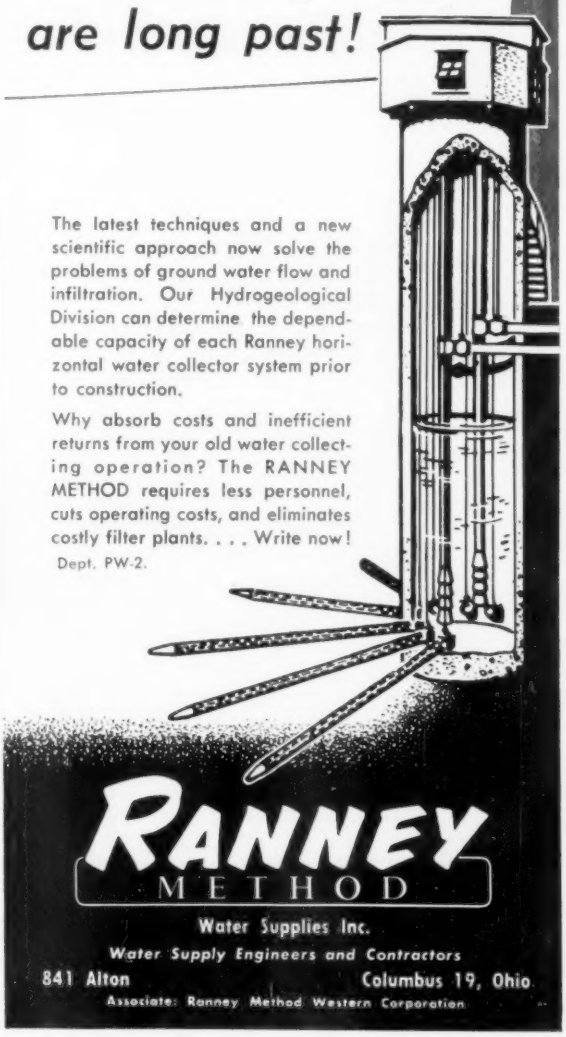
Wain·Roy BACK HOE and I-H Model 300

A low cost, versatile unit that combines back-hoe and backfill blade for all types of trenching and excavating. 6′ backfill blade, angles right or left, raises and lowers hydraulically.

Hoe is completely self-contained unit — on or off in less than 30 minutes. Digs in 190° radius — buckets 14″ to 36″ available — digging depth to 11′. Actuated bucket adds tremendous extra digging power to teeth. Many other superior features. For details see your I-H Industrial Power Distributor or write direct.

Wain·Roy CORP. Dept. C
Hubbardston, Mass.

the days of the Divining Rod are long past!



The latest techniques and a new scientific approach now solve the problems of ground water flow and infiltration. Our Hydrogeological Division can determine the dependable capacity of each Ranney horizontal water collector system prior to construction.

Why absorb costs and inefficient returns from your old water collecting operation? The RANNEY METHOD requires less personnel, cuts operating costs, and eliminates costly filter plants. . . . Write now!

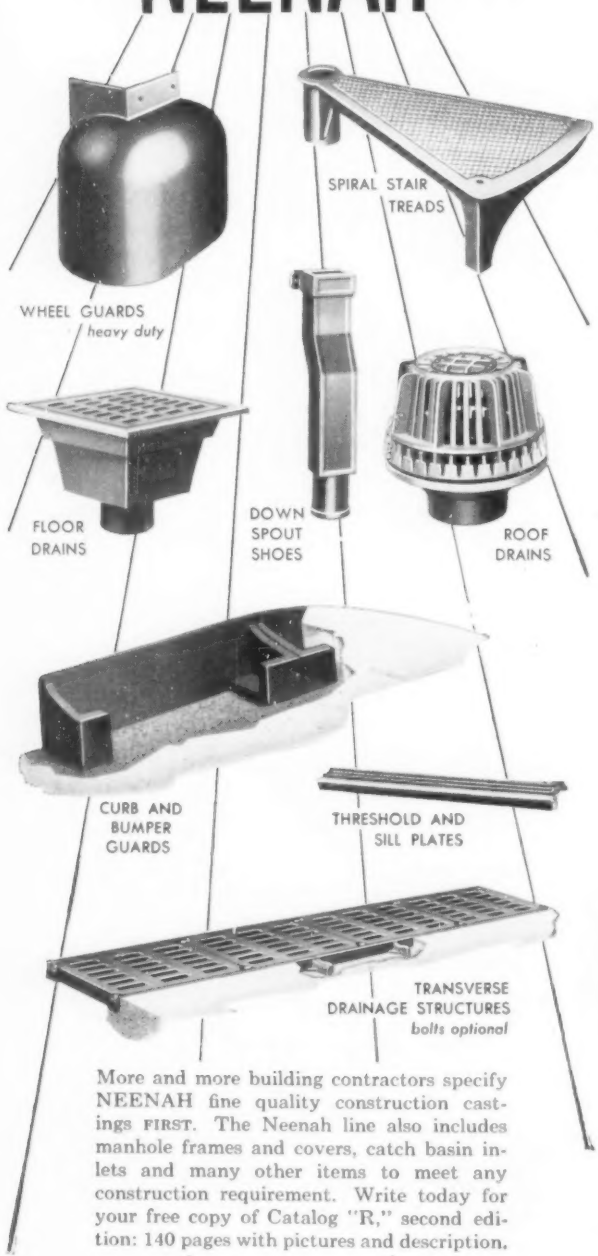
Dept. PW-2.

RANNEY METHOD

Water Supplies Inc.
Water Supply Engineers and Contractors
841 Alton Columbus 19, Ohio
Associate: Ranney Method Western Corporation

for lasting quality construction castings

SEE **NEENAH** FIRST



More and more building contractors specify NEENAH fine quality construction castings FIRST. The Neenah line also includes manhole frames and covers, catch basin inlets and many other items to meet any construction requirement. Write today for your free copy of Catalog "R," second edition: 140 pages with pictures and description.

NEENAH FOUNDRY COMPANY

NEENAH, WISCONSIN

Chicago Office — *5445 N. Neva Ave., Chicago 31, Ill.*

West Virginia	9.1	8.0	3.0	56.0	76.1
Wisconsin	19.5	13.6	9.1	107.0	149.2
Wyoming	10.4	7.1	.4	48.9	66.8
Hawaii	4.2	2.8	1.5	.....	8.5
Dist. of Col.	4.2	2.8	4.1	29.4	40.5
Puerto Rico	4.4	4.6	4.0	.....	13.0
Alaska	16.9	11.5	.2	.....	28.6

A Chemical Used For Algae Control

A new way to stop ponds from turning green with algae during the summer has been reported by the Naugatuck Chemical Division, United States Rubber Co. The chemical known as Phygon-XL is capable of holding down the growth, or killing, several types of algae and also some water weeds. If used when water temperatures are above 65° F and according to recommendations, it is claimed not to harm fish. In statewide tests in New Jersey last season the chemical controlled the growth of water milfoil, a submersed weed and the state's major water weed problem. A single application of the chemical held down milfoil growth for the season.

In California it was used successfully to control algae growth in some of the state's irrigation canals. It was also used on blue-green and green algae in a pond in the Los Angeles area that was stocked with rainbow and blue-gill trout. One dose of the chemical stopped the algae for six weeks and had no effect on the fish. The chemical was also successfully used in other parts of the Mid-West against blue-green and green-algae. In a test in the South it controlled growth of scum-forming green algae. In a New England test it was used with success on algae in the recirculating water system of an industrial plant.

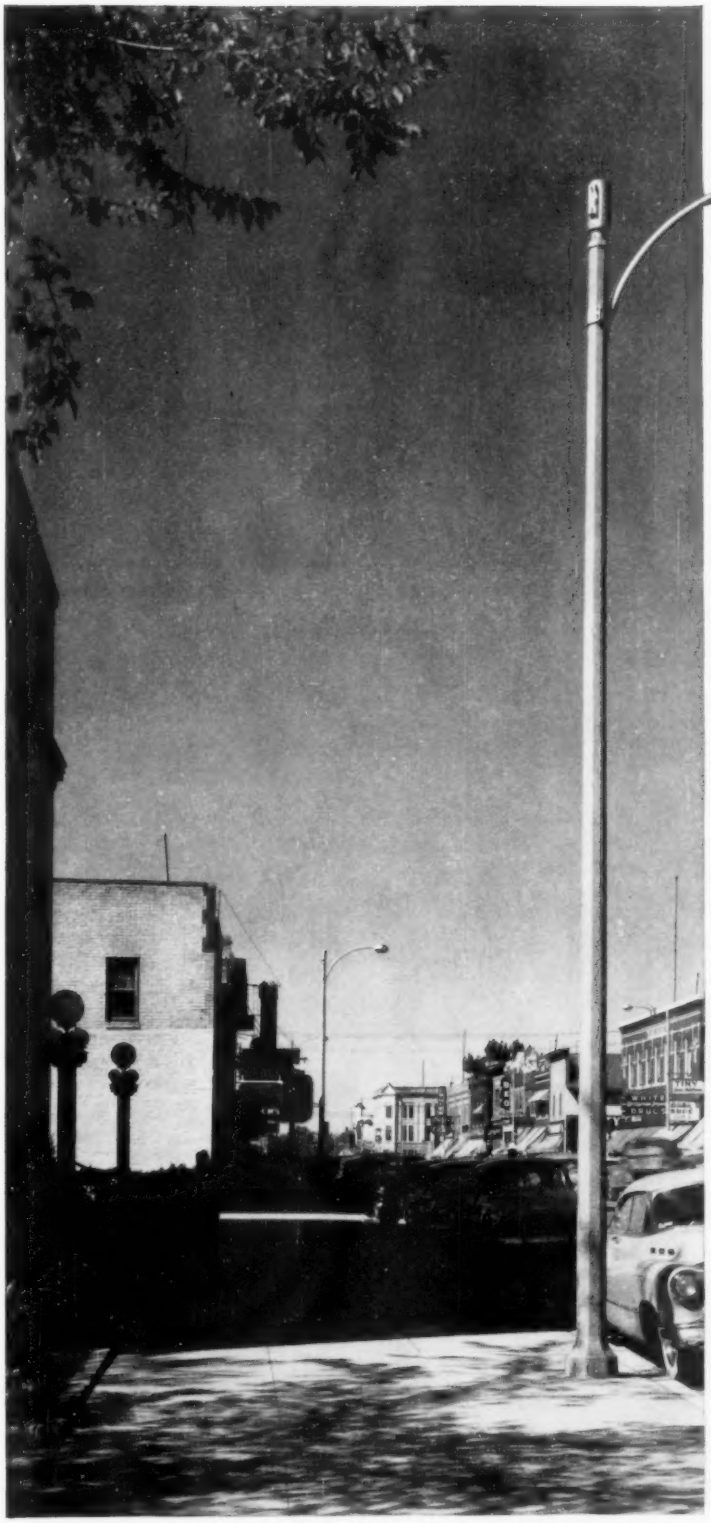
Relatively small amounts of Phygon-XL are needed to keep algae growth down. Blue-green algae can be controlled with ½ to 1 pound of the chemical for each acre of pond surface. On green algae 4 to 5 pounds are used per acre. Water milfoil, a submersed weed, requires 15 pounds per acre, and in this case only half the pond should be treated at one time.

At higher dosages, such as 15 pounds, it is possible to destroy oxygen-producing plants in the pond and so kill fish. Treating half of the pond at one time, then treating the other section about a week later is recommended.

Phygon-XL is a yellowish powder that will mix readily with water. It can be mixed with water, then sprayed on the pond surface. No matter what the method some care in handling is required. It can cause a skin irritation, similar to sunburn, if the concentrated chemical comes in direct contact with the skin.

Utilities Must Be In For Annexation

A new utility contract, which requires subdivision developers to install various utilities before annexation, was used when 227 acres were annexed by Midland, Texas, recently. These provisions will form the basis for a formal annexation policy to be established by ordinance. The required installations include all curbs and gutters; paving of all streets in the subdivision, plus paving of one-half of all streets which abut the subdivision; all water and sewer lines and approach mains; and all fire hydrants necessary to serve the new area. Within the subdivision, the city pays the excess costs of water lines over 6 inches and sewer lines over 8 inches. All installations must be made according to city specifications.



WHEN HY-LITES GO IN MAINTENANCE GOES OUT

WITH Hy-Lite Spun-Crete Standards, maintenance becomes a problem of the past. Their water-polished granite finish never requires painting. The original handsome appearance remains throughout the years.

In addition to maintenance savings, Hy-Lite Standards offer valuable installation gains. They are available with precast butt foundation, spun as an integral part of the lighting standard. No need for costly anchor rods or cast-in-field foundations.

Add to the features today's latest Hy-Lite development — *prestressing.* This means greater strength, superior ability to withstand weather extremes, and longer life. In short, you can see that *Hy-Lites have no equal.*

For complete information and dimensional data, write today to the American Concrete Corporation, 5092 North Kimberly Avenue, Chicago 30, Illinois.

◀ *Hy-Lite Standards add to the attractive appearance of streets and highways while providing dependable support for modern luminaires.*

American Concrete

PRESTRESSED CONCRETE LIGHTING STANDARDS

You'll never get tired

of Working

THE DAVIS BACK-HOE

This large, well-padded seat is designed for your comfort. It revolves with the boom so you always face the direction of your work. Control of the entire back-hoe is at your finger-tips, and you sit so you can see exactly where you're digging . . . even at 13 feet deep. Right angle operation, extra stability, quick attachment or detachment make it the most versatile back-hoe available with many quality features . . . and modern manufacturing techniques produce it at a price less than the average.

DAVIS

THE MOST EAGER LOADER YOU EVER SAW

The Davis Loader was cut out to do more work, and once you use it, you'll agree. With strength built in, it has no encumbering braces to mar your vision, or to hamper its work in close quarters. Positive-grip valve lets you handle jobs faster, more efficiently. Many attachments give extra versatility. Quality made, yet reasonably priced. Available for most tractors.

SOLD AND SERVICED NATIONWIDE BY BETTER DEALERS

Please send me literature on Davis Back-Hoe ☐ and the Davis Loader ☐ to fit a _____ tractor.

NAME _____

ADDRESS _____

TOWN _____ STATE _____

MID-WESTERN INDUSTRIES, INC.

1009 S. WEST STREET DEPT. P WICHITA, KANSAS

City To Build Central Service Center

Corpus Christi, Texas, expects to begin construction soon of a "central service center" to consolidate maintenance and warehouse facilities. Consulting engineers estimate costs of construction of the several buildings in the center and other site improvements at $1,152,200. It is estimated that the city will save $60,000 annually from the improved facilities to be provided at the center.

Municipal services to be housed at the center include gas, water, sanitary, street and sewer departments. In addition, the center will provide space for central communications, automotive maintenance and servicing, warehousing, equipment storage, meter testing and repair, paint shop, instrument repair, and exterior equipment washing facilities. The plans also provide parking space for 569 cars of employees.

The core of the service center will be in an operation control building where the offices of supervisory personnel for each of the five services would be located. Shops for auxiliary services will be located in other parts of the area. The control building will be arranged so as to encourage the administrative personnel of each division to coordinate their activities through frequent conferences. Two small conference rooms and one large one are provided in the center of the building, and all matters of operational procedures will be determined there.

At the same time, each supervisor will be located adjacent to his division. Five separate wings lead from the central area with each wing to be supervised by the superintendent's secretary which allows each superintendent to maintain complete control over his wing, including ingress and egress to prevent unauthorized persons from being in the work area.

One of the greatest benefits of this service center will be the ease of communication between division superintendents located in the operation and control building. The savings from more efficient coordination of activities might very easily exceed the tangible savings. Russell E. McClure is the city manager of Corpus Christi.

Twelve Towns Relief Drains

A project that covers the construction of a network of storm drains to relieve existing drains and provide adequate surface drainage in a 36 square mile area in the densely populated portion of the Detroit Metropolitan area is planned for construction to begin in the fall of 1956.

The work is being designed in 3 sections by 3 separate Consulting Engineering firms. The firms are McNamee, Porter & Seeley; Hubbell, Roth & Clark, Inc.; and Pate & Hirn. The program is being directed by Ralph A. Main, Oakland County Drain Commissioner.

The entire project will consist of 37.97 miles of drains and cost is estimated at $30,000,000. There will be 10.86 miles of tunnel work and 27.11 miles of open cut laying of pipe. The size of pipe ranges from 13½ x 14-ft. triple box, the maximum size, to a minimum size of 24 inches.

For the purpose of design and for subsequent information of construction contractors, 158 soil test borings were made, with samples taken at a minimum of every 5-ft. depth; and ring shear tests were made of all clay soil samples taken. Almost without exception excellent ground conditions were encountered in all borings, with heavy blue clay at the depths at which all drains are to be laid.

MOBIL SWEEPER®

Sets the Pace...

WITH ALL THE

WORTHWHILE

PERFORMANCE FEATURES

Fast, Efficient Economical Performance

—to the job and on the job— eliminates need of pickup trucks and follow-up crews—cuts street sanitation costs up to 45%.

The Quality Engineered 4-Wheel Design

and unequalled performance of MOBIL SWEEPER assure you superior service on any type street or terrain.

GREATEST MOBILITY • UNEQUALLED SAFETY • MINIMUM MAINTENANCE

MOBIL SWEEPER.

Safest Sweeper Built. No safety extras to buy... Cab and windshield plus dependable 4-wheel brakes included as standard equipment.

CONVEYCO

MOBIL SWEEPER.

A Division of The Conveyor Co.

3260 E. Slauson Ave., Los Angeles 58, California

please send literature on MOBIL SWEEPER

THE CONVEYOR CO.
3260 E. Slauson Los Angeles 58, California

NAME_____

TITLE_____

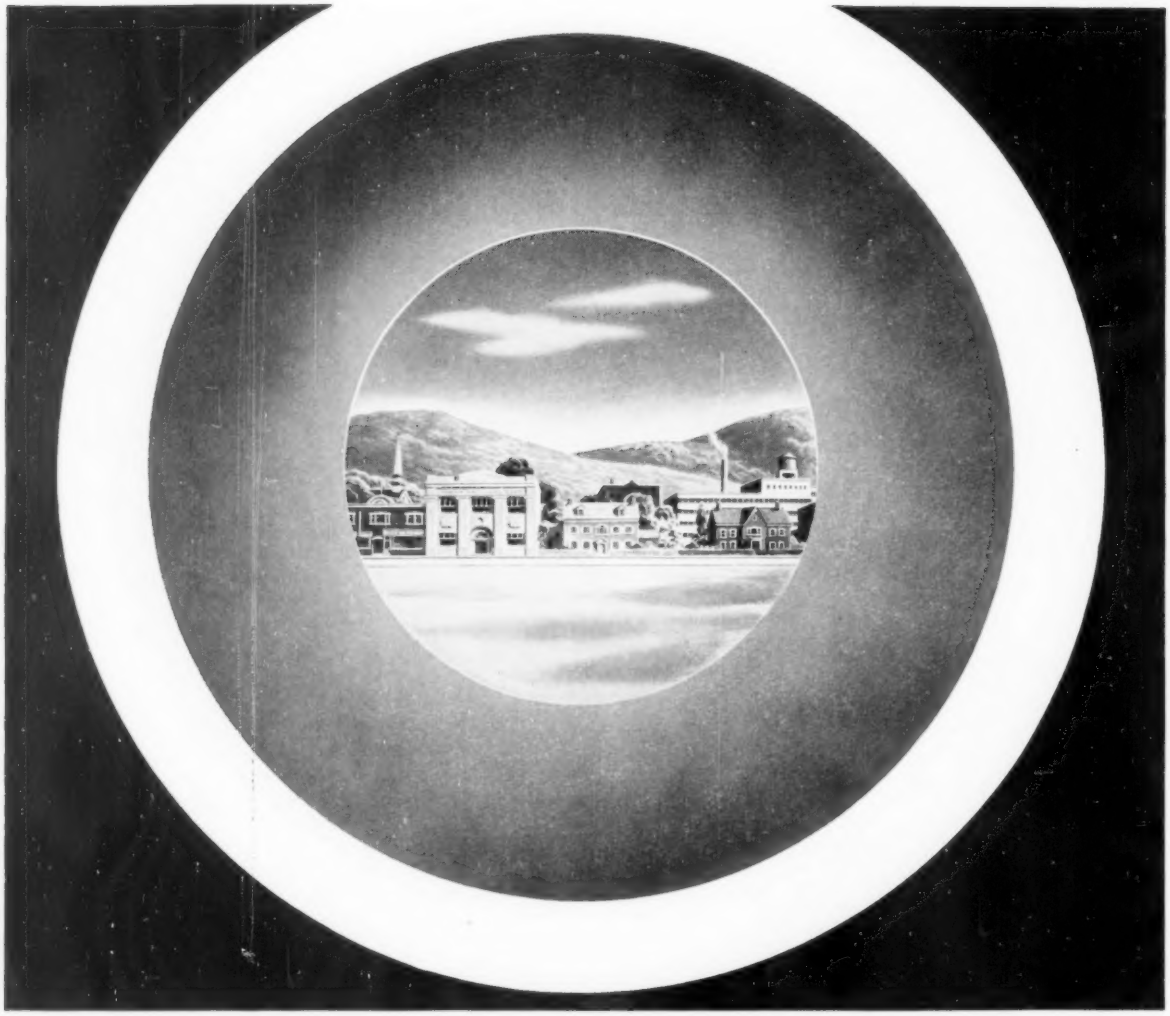
ADDRESS_____

COUNTY_____

CITY_____

STATE_____

PW-9



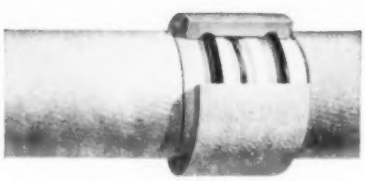
The pipe that's built for tomorrow

K&M "Century"® Asbestos-Cement Pressure Pipe slashes maintenance costs

Over the years, pumping costs are stabilized, maintenance is minimized with K&M "Century" Pressure Pipe. It is non-tuberculating, non-corrosive, non-electrolytic—its bore remains smooth and clean. "Century" Pipe is made of asbestos fiber and portland cement... two practically indestructible materials which assure long life.

And it's lower in initial cost, too! It's light in weight for easy, inexpensive transportation and handling, and even unskilled labor can lay it quickly in any kind of weather.

"Century" Pipe can save a community big tax dollars. Write for full information!

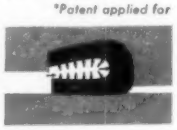


NEW K&M "FLUID-TITE"® COUPLING*

Crews can lay more pipe per hour in any kind of weather with K&M "Fluid-Tite" couplings.

*Patent applied for

Rubber rings compress to allow easy, quick entrance for pipe.

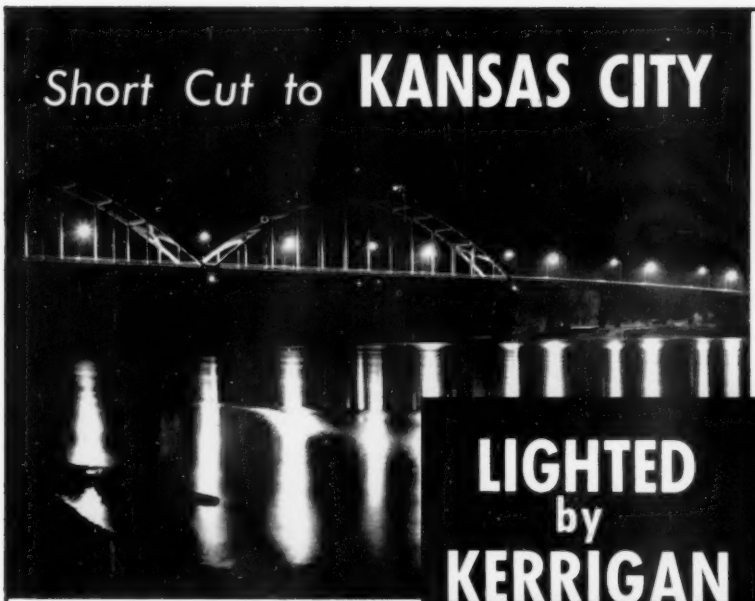


Pressure expands rings. Higher pressure means tighter seal.

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

K&M last in asbestos®

Short Cut to KANSAS CITY

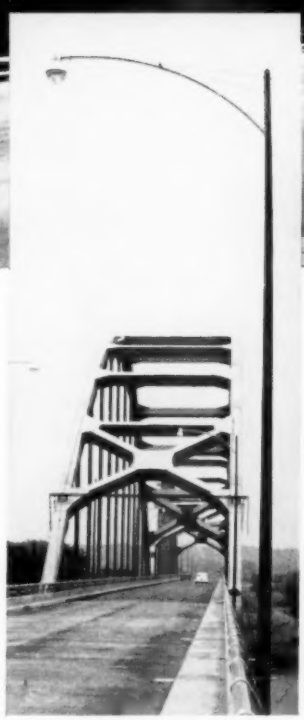


LEAVENWORTH Centennial Bridge

is a 6-½ mile stretch of concrete and steel which arcs across the Missouri River to connect Kansas and Missouri at a point where great saving in both time and distance are involved. It serves as a tie for the communities of Waldron, Farley, Beverly, Tracy, Platte City, and Weston to Leavenworth; and provides a short cut to downtown Kansas City.

LIGHTED by KERRIGAN

At the crossroads of Mid-America the newly completed Leavenworth Centennial Bridge is hailed as a model of efficiency combined with graceful design and as a symbol of future progress—a true monument to the vision of the men who planned it.



The LIGHTING of this bridge was part of this master plan; and the 30 tall and tapered KERRIGAN LIGHTING STANDARDS using 6,000 lumen lamps provide modern, bright as day lighting that is a true source of pride to the architects and engineers, Kerrigan's continuous tapered, octagon shaped standards, *Weldforged* of high strength, low alloy steel combine maximum strength with beauty of design.

KERRIGAN Lighting Standards meet the highest engineering standards and conform to I.E.S. Street Lighting Codes. If your city is in need of modern street, highway, or bridge lighting we invite you to consider KERRIGAN, the lighting standard fabricated to weather both the elements and the years. Let us send you detailed descriptive catalog and specifications. Write now for your FREE copy of our new LIGHTING CATALOG.

For better lighted city streets the standard is Kerrigan!

KERRIGAN IRON WORKS, INC.

NASHVILLE, TENNESSEE

General Sales Office 274 Madison Ave. New York City

NO. 933 TRAXCAVATOR*

on top of garbage disposal in Taylor, Texas

The City of Taylor, Texas, is another progressive community that gets rid of its garbage and trash by the sanitary landfill method. For some years a Caterpillar HT4 Traxcavator, purchased in 1946, was used. When the machine had run 20,000 hours it was traded in—at a good price—on a new CAT* No. 933 Traxcavator.

The Traxcavator does all the trenching, spreading, compacting and filling in layers, according to the recommended practice. "We haven't found its limit yet," says City Manager F. R. Cromwell. "It easily handles all garbage disposal for a city of 11,000."

The No. 933 is one of three new Traxcavators in the Caterpillar line, all efficient units for sanitary landfill as well as for other digging and loading purposes. Bucket capacities are 1 cu. yd. for the No. 933; 1½ cu. yd. for the No. 955; 2¼ cu. yd. for the No. 977. All have the traction and power to dig in hard material, to give you fast lifting action and easy maneuverability. A new oil-type clutch reduces maintenance and greatly lengthens clutch life. Full loads at every pass are assured by 40-degree tilt back of the bucket at ground level.

Nearly a thousand municipalities are now using Cat equipment to do a better job of sanitary garbage disposal. Your Caterpillar Dealer is equipped to help your engineers plan the most satisfactory method for your city. He has the right machines to fit your needs in a complete line of Traxcavators, bulldozers and scrapers, and the factory-trained service men to keep them in top condition. Ask him for a demonstration at the site you choose.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks

MODERN HEAVY-DUTY EXCAVATING EQUIPMENT

NEW DATA on Sewer INFILTRATION–EXFILTRATION RATIOS

Recent Tests Show that Values are Not Equal but Proportional

SHERWOOD BORLAND,

Chief Engineer,

Clay Sewer Pipe Association, Inc.

OVER THE YEARS, an accelerating amount of material has been written on the problem of limiting leakage of ground water and storm water into sanitary sewers. Charles R. Velzy of Nussbaumer, Clark and Velzy, New York City, and Joshua M. Sprague, Eastern Representative of the Clay Sewer Pipe Association, Inc., Columbus, Ohio, discussed this problem in a paper presented in 1954 at the 27th FSIWA meeting in Cincinnati. The present trend toward separate sanitary sewers instead of combined sewers, and the need for, and actual construction of, many sewage treatment plants has led to greater stimulation of thought, and focused greater attention, on this subject. Excess amounts of infiltered water require: (1) Extra pumping capacity and pumping costs; (2) larger diameter sewers and reduced reserve capacities; and (3) Additional expenditure of moneys for sewage treatment plant facilities for the larger quantity of total flow to be treated.

Ground water enters good sewer lines generally at only two points (a) the pipe joints; and (b) the fittings and connections on house and building sewers. Considerable attention has been directed to the improvement of joints and a great deal of progress in this direction has been made. Not nearly as much attention has been paid to fittings and connections and, as such, this part of the sewer system today is probably the area in which the greatest infiltration occurs. One apparent reason for this is that the house sewer is not fully constructed by the public authority since most of the actual connections originate on private property.

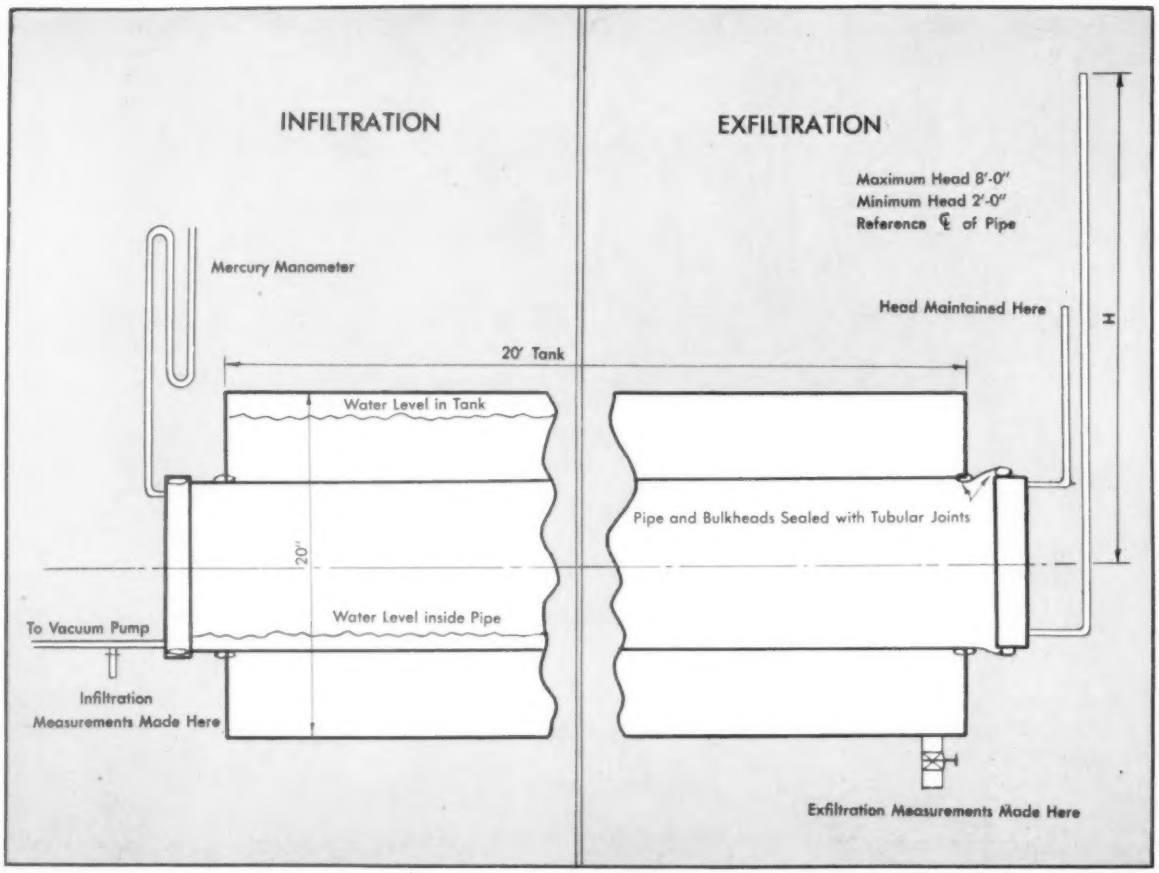
Recent findings, in two independent laboratory tests on infiltered water in sewer lines, give all engineers important new help in evaluating testing data. These tests were the outcome of several factors. As more engineers began setting actual limiting rates on infiltered water in public sewer construction—an accepted measure of efficiency and economy—definite testing procedures were prescribed to verify and check that the installed sewer line meet the allowable leakage characteristics:

Infiltration test. If the ground water is sufficiently high (ordinarily above the sewer pipe), actual infiltration may be measured by V-notch weirs, or by pumping the discharge into measuring devices.

Exfiltration or internal pressure test. These tests are indicated if the line is laid in a location subject to periodic or seasonal high water, which is not prevalent at the time of installation. The tests generally consist of blocking off a specified length of the sewer, perhaps between two manholes. The upper manhole is included in the test section and the line is filled with water to varying depths above the invert of the manhole (usually one to four feet). Measurement of leakage is the drop in water level in the manhole per some unit of time, with due consideration to leakage from manhole walls, certain absorption by the pipe itself and allowances for fittings which may be in the line and temporarily closed with a stopper.

In 1940, H. F. Lundberg of the Chester Engineers, Pittsburgh, Pa., is reported by Wilbur L. Dunn, then City Engineer of Uniontown, Pa., to have made tests on the same sewer line by the two methods. His tests at that time indicated that many pipe lines tested by an infiltration test and "found to be perfectly dry will show by the exfiltration test 25 to 50 percent of the allowable leakage of 10,000 gallons per mile per 24 hours."

Such data led engineers to antici-



● **TEST tank for infiltration-exfiltration tests, as made by Smith-Emery Co., to determine ratios for use in field.**

pate that an infiltration test of any given head might be more difficult to pass than an infiltration test of the same head.

Research Project Details

The Clay Sewer Pipe Association, Inc., requested the National Clay Pipe Manufacturers, Inc., Washington, D. C., to institute further tests to ascertain if a proportionate ratio might exist between infiltration and exfiltration in testing. A. E. Reed, Research Director of the National Clay Pipe Manufacturers, Inc., conducted such tests at its Research Laboratory; then requested the Smith-Emery Testing Laboratory of Los Angeles to reproduce independently the test to verify his findings.

Arrangement for the test by Smith-Emery consisted of a line of seven lengths of 8-inch ID nonglazed clay pipe, fitted together with tubular seals placed around the spigot ends and inside the bells. The seals were filled with T. J. 41-Portland cement mix of 4 parts cement, 1 part T. J. 41 and about 2-1/3 parts of water by volume for workable consistency. The joints were inflated at 50 psi. Leaks were induced at joints 1, 2, 5 and 6 by using U-shaped No. 10 galvanized wire between the pipe and the seal prior to inflating the seal. The pipes were filled with water and allowed to stand 7 days, with water maintained at one-foot head.

Readings were taken at four positive external pressures to make the exfiltration heads; and at negative internal pressures to make the infiltration heads. During each test, readings were taken at 10-minute intervals, for one hour. The plus and minus readings were alternated from one test to the next one. Results are shown in Table I.

TABLE 1—Induced Leaks

Pressure	*Exfiltration*	*Infiltration*
psi	*liters*	*liters*
0.87	26.7	25.4
1.74	39.5	31.7
2.60	48.9	35.3
3.47	52.8	37.3

Each volume reported was the average of five 10-minute interval readings. The readings were quite uniform. The exfiltration was made with a positive pressure and the infiltration was made with a negative pressure in the pipe.

The exfiltration minus the infiltration, calculated to percentage, based on the exfiltration volume, follows:

Pressure	*Percent*
0.87 psi	4.8
1.73 psi	19.8
2.60 psi	27.3
3.47 psi	29.4

A graph can be constructed to show the above relationships between infiltration and exfiltration. In the tests, there was some leakage when the wires were placed in the joints. During the first test, without the wires in the joints, there was no leakage.

The results of these tests substantiate the earlier test made by Mr. Lundberg and offer conclusive evidence that the infiltration and exfiltration tests do not give equal values but do give proportional values in the ratio shown.

Rural Traffic Counts are not hard to get

WILLIAM C. BURNETT

Junior Engineer,

Tompkins County Highway Dept.

Ithaca, New York

MR. TYPICAL Resident, who pays the bills for all township and county highway work, has asked the following questions: 1.) What are you going to do about the condition of my road? 2.) Why is it that my road is usually the last to be plowed after a snow storm? 3.) Why can't we have a stop sign or traffic signal erected at our corner?

In answering these questions, to Mr. Resident's satisfaction, the local highway official must be a good salesman. He will probably admit that Mr. Resident's road is important. He may also get him to agree that all roads are important. The local highway official may even show Mr. Resident that, in the overall picture, other roads are generally more important than the one in front of his house.

This is the tough part though: Mr. Resident will not be easy to sell on the importance of other roads. If we are ever to sell him, we'll need concrete information on what constitutes the degree of road importance. This is where traffic counts help a highway official. Traffic counts provide the local highway official with relative vehicle volumes traveling over his road system. Armed with such facts his decisions are raised above the the level of opinions.

To be sure there are many factors in addition to traffic volume which should be considered in a determination of road importance. Some of these are: 1) School bus, mail and milk routes; 2) service rendered by the road in connecting communities, providing access to manufacturing plants or recreation facilities; and 3) land use along the road such as farming, commercial, residential or abandoned land.

However, traffic volumes are in many cases a reflection of one or more of these factors, but they are more easily acquired and more objective than are the other factors. Traffic volumes also show year-to-year trends or shifts in road use. For these reasons traffic volumes should be acquired over the entire road system. Once obtained they can be used in conjunction with the other factors as a basis for road improvement and snow removal priority.

The matter of erecting signs and signals has always been a source of headaches for local highway officials. Since traffic signals and stop signs are a legal demand for a full stop, enforceable by law, they should not be erected without a thorough study of the facts. Most states have requirements, on one or more of the following, which must be met before erecting a stop sign or traffic signal: 1) Traffic volume entering a main road from a side road; 2) Sight distance from the side road along the main road; and 3) accidents at the intersection. These requirements are generally known as "Warrants." They establish the advisability and many times the legality of signs or signals.

If your state has no Warrants which apply in your case, a very comprehensive manual entitled "Uniform Traffic Control Devices" is available for one dollar from the Bureau of Public Roads, Washington, D. C. The Warrants contained in this manual have been the basis for many state and city ordinances.

How to Get Traffic Counts

If we agree that we need traffic counts, as a factual basis for our decisions, the next question is how should we get them? There are two methods of counting traffic. The first is to count and keep tally with pencil and paper. The second is to put out automatic counters.

Counting with pencil and tally sheet is used mainly at intersections where turning movements must be recorded. If a sign or signal Warrant does not call for anything but total traffic (both directions) on roads entering the intersection automatic counters can be used.

Machine counters are now used almost exclusively to obtain total vehicle volumes. Considering present day cost of labor, the trend toward automatic counters is understandable. The least expensive automatic counter costs about half of a union laborer's weekly salary.

There are two general types of automatic counters—those that are installed permanently, and those that are portable. Some of the permanent counters use photo electric cells and register a count each time the light beams are broken. Other permanent installations use pressure sensitive pads in the pavement or magnetic detectors under the roadway. Permanently installed counters are too expensive and inflexible to be of much interest to local highway officials. They are used primarily on heavily traveled state highways where a continuous record of hourly or daily traffic volume is desired.

Portable counters provide an economical method of obtaining vehicle volumes. They can be installed at a particular road location in a matter of minutes. The counter, most commonly used on rural roads, records the total number of vehicles passing over a rubber road tube.

Although this counter cannot be reset to zero each time it is installed, it is a simple matter to record the count when it is put out and again

● **RURAL road counters, installed in a few minutes, measure total traffic.**

● **COUNTERS of portable type can be used for city streets or country roads.**

TOMPKINS COUNTY — HIGHWAY DEPARTMENT

ROAD WARREN RD. C.R 121 — TRAFFIC DATA

	DATE	DAY OF WEEK	TIME OUT	TIME IN	INITIAL READING	FINAL READING	TOTAL VOLUME	DAILY VOLUME	LOCATION	REMARKS: WEATHER	REMARKS: ROAD CONDITION	REMARKS: OUT BY	REMARKS: IN BY	REMARKS: OTHER
1955	9/5	Th	9.00		45735		404	404	0.5 Mile south of West Dryden Rd	Good		WCB		
	9/6	F		9.10		46139						WCB		
1956	9/11	T	1.30		86978		901	450		Rained Wed PM		GFJ		
	9/13	Th		1.18		87879						WCB		

● **SEPARATE sheet is made for each location and placed in the notebook with the guide map. Space is provided for six counts on each sheet, permitting trend study.**

when it is picked up. The difference gives the number of vehicles which passed over the road tube while the counter was in use.

The most refined of the portable counters records traffic volumes on a paper tape. This record is printed every 15 minutes or every hour, and the counter then resets to zero.

The companies which make automatic counters furnish excellent instructions for their installation and adjustment. In a short time even inexperienced personnel can become adept at using the small automatic counter.

How Long A Count?

Counts at intersections should be taken for periods corresponding to the Warrants which apply for traffic control devices. For example, this may mean counting for eight hours continuously, or counting for three periods of two hours and forty minutes during the times of heaviest traffic flow. It is a good practice to take counts on more than one day at any particular intersection.

When counting traffic on rural roads a good rule to follow is "the longer the better." A count taken for five days and then divided by five gives a bettter representation of daily traffic volume than one count taken for 24 hours. Where counts are taken once every year or so the United States Bureau of Public Roads recommends 48 hours as a minimum. The length of time an automatic counter can be left at one location will be determined by the number of counts to be obtained each year. It is a better practice to cover your highway system over a period of several years than to take short counts in order to cover the whole system during a one-year interval.

In order to compare volumes on different roads it is important that the volumes counted represent traffic during an "average" period. Weekend traffic may be heavier or lighter than normal. Local events may greatly alter the traffic flow. Hunting season openings and local disasters such as fires or accidents are two good examples.

Troubles and Records

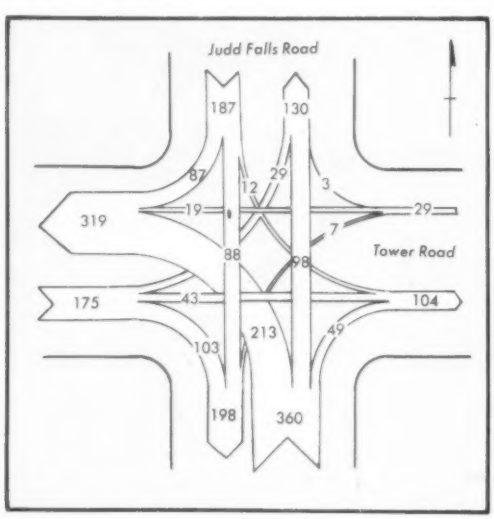
The rubber road tube used on portable counters is a potential source of trouble. If placed on a curve or near an intersection where vehicles are starting and stopping it may be pulled loose from its fastenings. The tube itself invites pedestrians to stomp on it, and on lightly traveled roads drivers sometimes cannot resist the urge to stop and run back and forth over it.

Cold weather reduces the efficiency of battery operated counters. If put out before an unexpected snow storm the tube may be ripped up by a passing snow plow. In northern states then, it is advisable to count traffic only during the late spring, summer and early fall months.

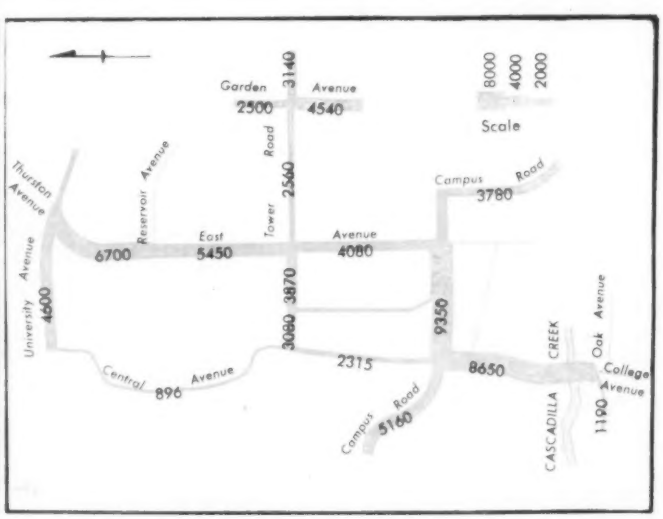
When counting traffic on rural roads it is helpful to have standard forms. Such forms should have columns for: date, day of week, and time out and in; initial and final reading; total and daily volume; weather and road conditions; and remarks.

There are many methods of keeping traffic counts indexed for future reference. The following system, used by the Tompkins County Highway Department has been found to work out well.

1. Before taking counts, all counting stations are selected and indicated on the county highway map. Stations are selected where physical road conditions are favorable and where traffic is expected to be representative.
2. A separate sheet is made out for each location and all sheets



● **TRAFFIC flow pattern through an intersection, showing turning movements and volumes in one map.**



● **FLOW map shows vehicle volumes for 24-hour period over entire highway system. Heavier traffic volumes are shown by heavier lines.**

are put in a notebook with the guide map.

3. The sheets are consequently numbered and the corresponding location on the guide map is numbered the same.

There are three distinct advantages to this system: 1) The sheets are large enough for six counts, eliminating the need for a new sheet each time a count is taken; 2) by having several counts on one sheet trends may be observed in traffic volumes; and 3) notebooks keep the forms together both in the office and while counts are taken in the field.

Presenting Traffic Counts

Traffic volumes on all portions of a highway system can be effectively presented on a vehicle volume flow map. To make a map, traffic volumes are split into groups of your choosing (for example, 0-150, 151-400). The groups are schematically represented by lines of different widths. The heavier the traffic flow the wider the lines. Using a road map as a base, traffic counts are written on the map at the location where they were taken. The road intersections are then connected by the proper width line.

A flow map such as this shows at a glance the pattern of traffic volume on the entire highway system. Such a map is particularly effective in dealing with the public. The map is also of interest to the official board which is responsible for appropriating money for highway improvements. This is useful in presenting to citizens and traffic committees, a pattern of traffic flow through an intersection. The chart shows many counts and turning movements in a single picture. The volume of vehicles entering the intersection from each street is plotted to scale. Each entering volume is then split into left, right, and straight volumes which join with other volumes leaving the intersection.

Why not now?

If, like most highway officials, your time is too taken up personally to count traffic or place automatic counters, why not get some intelligent young man in your organization interested. Make him responsible for a program of traffic counting and let him set it up. Once the facts have been collected you'll probably wonder why you waited so long.

LANDFILL at Annapolis, Maryland

● **SANITARY landfill at Annapolis, Md., has been in operation for nearly five years. Disposal area covers some 19 acres and is 4½ miles from the center of city.**

"A VERY SUCCESSFUL sanitary landfill operation" is the term applied by J. M. Axelrod, City Engineer, to the refuse disposal program being carried on at Annapolis, Md. The program was initiated in 1951 when the refuse disposal situation became critical immediately following annexation of surrounding areas to the city. The population of Annapolis was practically doubled, resulting in serious overloading of an incinerator constructed in 1937. The population of the city is now about 30,000 and there are about 3,000 cadets at the United States Naval Academy.

The fill is being operated in an area of about 19 acres which is located approximately 4½ miles from the center of the city. Operations at the fill are shown in the color illustration above. In its refuse collection system. Annapolis utilizes seven collection trucks which bring 28 to 30 loads of refuse to the fill daily. In addition to this, about six truckloads are brought in daily from the naval academy and one load from St. John's College, which is located in Annapolis.

The unit shown at work in the illustration is a D7 Caterpillar tractor, equipped with a bulldozer blade and pulling a No. 70 pan or scraper. Dirt for the fill is brought in by the scraper from about 800 ft. away, the average load being 10 cu. yds. Concerning the equipment, Mr. Axelrod says: "During the coming months we plan to replace the small tractor and bulldozer unit which is being retired after many years of faithful service. The replacement unit will be larger so that we can obtain a higher degree of compaction; and it is also intended that this new unit will be interchangeable with the unit now pulling the pan."

The color photograph from which this reproduction was made was taken by E. W. Railsback on 4 x 5 Ektachrome film and was furnished us by Caterpillar Tractor Co.

● DIGGING all trenches, stockpiling all cover material and placing final cover is function of mobile units like this one.

PERIMETER SANITARY LANDFILL *for* DALLAS REFUSE DISPOSAL

G. C. BRINKLEY

Supt., Division of Sanitation,
Dep't. of Public Works,
Dallas, Texas

EVERY MUNICIPALITY, be it a large city or a small village, has a continuing problem of disposing of its waste and refuse. The most suitable method is one that guarantees the best sanitation at the lowest taxpayer cost; and, if possible, the smallest initial investment. The sanitary fill method of refuse disposal is an old story to Dallas, Texas, as it was one of the first cities to adopt the present day form of sanitary landfill and it has been in the landfill business roughly 14 years.

Numerous changes have taken place during this period, and the Department of Sanitation has grown until it now has at its disposal some 157 collection trucks (including 15 packer-type); 10 crawler tractors with bull clams; 2 self-propelled primemovers with scrapers; and one rubber-tired bulldozer.

The city and metropolitan population of approximately 500,000 persons are served by five widely separated and strategically placed dumps around the city's perimeter. These are located at West Dallas, Manana Street; Highway 114, Morrell Street; and Military Parkway. As is the case for nearly every city of this size, land, whether good or poor, is at a premium and Dallas has a continuing problem of finding suitable land within reasonable hauling distances of various sections of the city.

As a rule, all dumps are leased from the owner and are returned on completion. As a result, we are able to use many of the waste areas in and about the city. Completed fills in the past have been utilized for parks, playgrounds, housing developments, commercial uses (a roofing company, golf driving range, auto trucking company), agriculture and many other purposes.

By operating dumps centrally located in respect to the various sections of the city, collection costs are reduced by decreasing haul distances, size of truck fleets and operating personnel. However, a slightly increased cost for landfill machinery has been necessary to operate the five dumps. The use of areas close to or within the city has made necessary an educational program for those in the vicinity of the dumps, and a careful policing of those dumps near residential areas to insure that they will not become public nuisances from odors, rats, flies and burning or blowing refuse.

The five landfill areas receive approximately 26,000 tons monthly of refuse from city collection trucks. To this figure must be added the additional 14,000 tons of trash from commercial haulers. City hauling equipment accounts for approximately 240 loads per day, averaging 14 cubic yards of garbage per load.

The controlled burning of combustible refuse is permitted in certain sections of the various dumps where such burning will not create a nuisance. Burned material is then compacted and covered. Dumps near

● MR. BRINKLEY, in charge of the work he describes in this article, is standing beside a LeTourneau rubber-tired bulldozer. Mobility of such units has been helpful.

residential areas are fenced to contain blowing refuse and paper. Licensed contract scavengers are authorized to pick the dumps for salvable items. There is no segregation of garbage and refuse; all materials go into the landfill.

Sanitary Fill Methods

The method of building the various fills are adapted to fit the terrain and the needs. Trench area or ramp method is used. The areas the various fills embrace vary from 4 to 20 acres. We have found that the quality of the completed fill is in direct ratio to the type of equipment used for compaction. The heavier the equipment, the better the fill. The policy has been to retire smaller tractors and replace them with larger and more mobile earth-moving equipment.

Basically, this is the manner in which we are currently operating:

Crawler tractors with bull clams are allocated to the various fills on the basis of need. The bull clams have the missions of spreading and compacting the refuse as it is dumped by truck into the trench and of spreading four inches of earth cover over the compacted garbage from nearby stockpiles at the end of each operating day.

A mobile fleet of two D Tournapulls with D Scrapers and one rubber-tired bulldozer has the mission of digging all trenches, stockpiling all cover material for all five dumps, and making the final cover when the fill has reached the desired grade. These three units travel under their own power over city streets to the various dumps on a set schedule, based on the needs at the various locations. In addition, they are often dispatched from dump to dump to handle compacting and covering of daily refuse deposits when other equipment is temporarily down for repair. These machines also close unauthorized dumps which may spring up in and around the city. In many instances, cover material is hard to find and must be transported up to one half mile. Tournapulls are push loaded to insure maximum loads.

Good solid sanitary landfills are built with well compacted layers of refuse rarely more than 4 feet deep. The refuse is sealed off daily with 4 inches of earth and is topped with 18 to 24 inches of earth when the desired grade is reached. Generally, settlement slightly in excess of 10 percent can be expected. Pits or trenches are generally excavated to depths of 10 to 15 feet which allows for up to 20 to 25 feet of completed garbage fill. With some old gravel pits, depths of 30 feet are not uncommon. The depth of garbage fill depends, of course, on the nature of the terrain.

Cover material is normally stockpiled for several days' requirements, inasmuch as rain often fills the low swampy trench areas and brings excavation to a standstill. It has been found to be good practice to have an adequate trench dug several days ahead of actual need.

● DAILY sealing off with 4 ins. of dirt, good compaction and 18 to 24 inches of final cover are essential elements. Here a Tournapull is spreading a layer of cover.

Procedure in Landfill

The sanitary landfill has proved highly successful for us. Summarizing, we find that these procedures have improved our operations:

1. Operators of heavy equipment have in some instances been factory-distributor trained. This has cut equipment repair and maintenance costs to a minimum. Operators are experienced hands; they know how to handle and look after their machines.

2. We have tried to select sites with good access roads. We find these are quite necessary in bad weather and always economical.

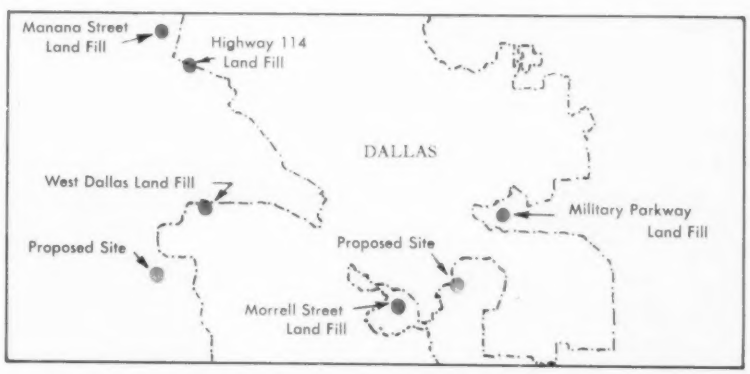
3. Selection of sites around perimeter of city to serve specific areas reduces collection equipment needs and costs.

4. A careful policing of dumps to eliminate rat, fly, odor and blowing refuse nuisances is necessary, thus constantly demonstrating to the people that sanitary landfills are not objectionable.

5. A careful selection of what we believe to be the best suited equipment for our scattered operations is important. Equipment needs are periodically reviewed to ascertain if our operations can be handled more efficiently. We find mobile self-propelled equipment a necessity for our scattered operations.

6. Careful prior determination of height of fill, slope for natural drainage, appearance, etc., eliminates many of our operational problems.

We are well satisfied with the Dallas landfill from the point of economy. Disposal cost of refuse at the fill runs approximately 39¢ per ton or roughly 10¢ per cubic yard of loose material. This sum includes the cost of dump supervision, equipment operators and all equipment.



● SANITARY landfills in convenient areas on the perimeter of the city.

COUNTY REFUSE COLLECTION and

Franklin County shows a profit on collection service and disposal site operations, yet residents save money

DESSO T. MITCHELL

Franklin County Sanitary Engineer,

Columbus, Ohio

NOT THE least of the problems accompanying unusually rapid growth in suburban areas is the orderly and satisfactory collection and disposal of such waste materials as garbage and refuse. Franklin County, Ohio in which the City of Columbus is located, has such a problem. The population of the entire County, including the City of Columbus, increased from 388,712 in 1940 to 503,410 in 1950. The estimated population in 1953 was 532,649 which represents a gain of over 37 percent in the 13 years immediately preceding. Much of this growth has occurred in those suburban areas where sewer and water facilities were available or could readily be made available; and these areas now contain a population density equal to similar residential areas within the corporate limits of Columbus.

With this growth, it soon became apparent that one important service normally provided in large municipalities, was lacking — namely, garbage and refuse collection and disposal. Some county residents were able to contract with private haulers to provide weekly pick-up service while others were required to fend for themselves. The result was littered highways, unauthorized and illegal dumping and the establishment of numerous dumps around the County which were either poorly supervised or not supervised at all. Continuous fires with resulting smoke and odors from burning dumps were a constant annoyance to residents in the neighborhood.

Many citizens and civic leaders, as well as numerous township trustees and officials of several villages, began to demand a solution to the problem. Since the Board of County Commissioners were the only elected officials which could represent all of the people in the County, the complaints and demands naturally were channeled to their office. Fortunately, these men were sufficiently conscious of the problem and of their responsibilities to start looking for a solution.

Six years ago the Ohio State Legislature passed a statute which, in general, authorized Boards of County Commissioners to establish garbage and refuse collection and disposal districts within their respective counties and to provide the necessary facilities for this service. The same statute authorized the Boards to finance such projects through the sale of revenue bonds. This new law (with some subsequent changes) appeared to offer a logical solution.

Since the law provided that the administration and supervision of this service should be a function of the County Sanitary Engineering Department, the writer was directed to study the feasibility of such a program. At about the same time, numerous informal hearings and meetings were held throughout the County to which all interested parties were invited. These meetings were usually sponsored by the township trustees, village mayors or interested community committees. The purpose was twofold: first, to acquaint the public with the fact that a garbage and refuse collection service, on a county wide basis, was being considered; and second, to obtain an idea as to whether the public would accept a reasonable charge for such service.

The results were, in most instances, rather surprising. It seemed that acceptance was assured, hence it was decided to start as soon as possible.

● **FRONT-END loader of 2 cubic yards capacity was required to care for the increased volume of refuse. Fill operation has cost 37 cents per yard; overhead 18¢.**

Land Fill Selected

The land fill method was selected for the type of disposal. Closed mechanical packer type trucks were decided upon for collection. It was planned to provide weekly pick-up service except in the case of commercial establishments, such as restaurants, where more frequent pick-ups would be necessary.

Negotiations were started at once for the sale of revenue bonds. In order to retire these bonds and to finance the cost of operations, rates of $1.00 per month were established for single residences, or per unit in

the case of the multiple dwellings, with the resident bringing the containers to the curb or the alley line as might be necessary. In order to add to the revenue, a rate of 75 cents per packed cubic yard was set up as a fee to charge all private haulers who might wish to use the county land fill as a place to dispose of their loads. It should be explained that a packed load was considered to be one-half the volume of the loose load as it arrived at the fill. Each private hauler was also required to purchase a license for each truck at an annual charge of $5.00.

In 1952, $66,787 of revenue bonds were sold which provided the funds to purchase immediately two 12-cubic yard packer type trucks, one 2-yard dump truck, a 1-yard front end loader (skid shovel) and a sheet metal building to house the equipment. The land fill and pick-up service was started on October 1, 1952.

During the planning stage it was estimated that private haulers would deliver 20 to 25 loads to the fill each day. This estimate proved to be entirely to small. As soon as the numerous miscellaneous dumps were closed on order from the County Board of Health, the haulers were forced to find other means of disposal. Many of them decided to use the County land fill site. It should be noted that these private haulers pick up garbage and refuse from customers located in areas which could not be served by the County operated trucks. During 1955 the amount of refuse received at the fill from private haulers varied from 125 to 150 loads per day. This material was in addition to that delivered by the County operated trucks.

In 1954, it became evident that the 1-yard front end loader could not excavate sufficient trench and also pack and cover the garbage and refuse which was being received. Furthermore, the demand for pick-up service in additional sections of the County, not yet covered, became rather insistent. In order to expand the service and to provide adequate operation of the land fill, a second series of revenue bonds were sold in the amount of $61,000. These funds were used to purchase a ¾-yard backhoe excavator for trenching purposes, another 15-yard packer truck, a heavy duty bulldozer and an extension to our sheet metal storage building. Early this year (1956) the one-yard front end loader was traded in on a 2-yard machine of the same type.

Operating The Fill

The trench for the land fill, as it is currently being operated, is excavated to a depth of about 14 feet below the original elevation of the ground and to a width of about 25 feet. The soil is a river deposited silt mixed with sand and gravel. The fill is made in two layers, each about 9 feet deep with the first layer completed the full length of the trench before the second is started. The trucks dump from the end of the trench which adds to the compaction since the vehicles must drive over the fill to reach the dumping face. Further compaction and control of the fill elevation is obtained by the constant use of either the bulldozer or the front end loader. A thin layer of soil is placed over the top of the first and second layer of refuse as the trench is being filled, except during very wet weather. The final soil cover, to a depth of 2 to 3 feet, is placed after both layers have been completed. The finished ground surface is about 6 or 7 feet higher than the original ground elevation.

During the last three months of 1952, the cost of operation exceeded our income by about $10,000. During the first full year of operation (1953) the operating cost was only a few dollars more than our income. In 1954, our income exceeded our operating costs by $10,482 and in 1955 by $28,934.

In 1955 there were 143 licensed private haulers using our landfill and the county trucks served about 3,341 residential pick-up customers as well as a number of trailer camps and commercial establishments.

The accompanying tabulation gives a breakdown of our income and operating costs for 1955.

Garbage and Refuse Collection and Disposal Data
Franklin County, Ohio, 1955

PACKED CUBIC YARDS TO FILL	Private Haulers	78,587
	Pick-Up Service	10,247
	Total	88,834
COST OF PICK-UP SERVICE	Labor	$ 22,656
	Other	4,161
	Total	26,817
COST OF OPERATING LAND FILL	Labor	$18,650
	Other	13,636
	Total	32,286
OVERHEAD COSTS	Superintendent	$ 5,340
	Office	6,034
	Leases	560
	P.E.R.S. *	3,377
	Workmen's Comp.	636
	Total	15,947
TOTAL OPERATING COST	All Expenses	$ 75,050
OPERATING COSTS PER CU. YD.	Pick-Up Service	$ 2.62
	Fill Operation	0.37
	Overhead	0.18
	Total	3.17
INCOME	Pick-Up Service	$ 44,591
	Private Haulers	58,940
	Salvage	453
	Total	103,984
INCOME PER CUBIC YARD	Pick-Up Service	$ 4.35
	Private Haulers	0.75

*Cost of Public Employees Retirement System.

MECHANIZED STREET CLEANING

The desire for a more attractive environment through cleaner streets is fundamental in our way of life. Its fulfillment requires the cooperative effort on the part of both the public and the Sanitation Department. In the article, "New York Proves Anti-Litter Campaign Can be Effective", published in PUBLIC WORKS, January, 1956, a blow-by-blow account was presented outlining the steps taken in the campaign to secure public cooperation. This public relations campaign is still going forward at full speed ably assisted by the Citizens' Committee for a Clean City headed by Keith S. McHugh, President of the New York Telephone Company as Chairman and Sigurd S. Larman, President of Young and Rubicam, Inc., as Director. The part the Department is playing in the development of the new techniques and equipment, particularly in the direction of mechanization of street cleaning will be related in this article.

ANDREW W. MULRAIN

Commissioner of Sanitation,

New York City

THUMBING THROUGH the old annual reports of the Department of Street Cleaning, the predecessor of the present Department of Sanitation, we find that mechanization has long been the fond hope of New York City officials charged with the responsibility of street sanitation. Report after report emphasizes the need for labor saving devices for easing the laborious task of street cleaning. It is interesting to note that in the report of 40 years ago with the population of the City a little more than 5,000,000, with 1,600 miles of paved streets, 150,000 horses and only 65,000 automobiles, the inability to clean streets properly by manual sweeping was pointed out. Although New York was not a little city then, a remarkable growth has occurred in the meantime. Today's city has about twice the population, 8,200,000 residents and 3,000,000 transients; has 20 times the number of automobiles registered in the city, 1,200,000; and has 3½ times the street mileage, 5,700 miles. This growth brought on a tremendous sanitation problem in a comparatively short space of time, a little more than the length of City service of the present Commissioner.

The progressive deterioration of the appearance of the streets of the City was accelerated as much by sociological and economic changes in the City's makeup as by the City's growth. Entire neighborhoods of one and two-family houses where formerly personal pride and civic virtue were controlling factors in maintaining good street sanitation, have been replaced by apartments or multiple dwellings, or have deteriorated into sub-standard living areas. The resulting absentee ownership has caused a loss of locality identity and of individual responsibility for clean streets. Previously, home owners felt that is was incumbent upon themselves to pick up litter dropped in front of their property. Fortunately this attitude of divorcement on the part of the public has been reversed to a marked degree by the intensive campaign against litter.

At the beginning of the century the famous "white wing" manual sweeping force was created to sweep the streets of the City of New York. As time went on, the panacea for the acute problem created by the changing city was to put more men on the job until finally a maximum of about 4,500 men were employed as street sweepers. However, two world wars, the financial stringency created by the depression, and the subsequent scarcity of manpower for this type of service, dropped the personnel employed for street sweeping as low as 900 daily. This is far below the number required to perform this service for it has been estimated that under today's conditions approximately 11,000 men would be required to clean the City's streets. Even if the men were available, hand labor is no longer feasible for this job. The phenomenal increase in the number

● **AFTER a welcoming parade for a celebrity, New York's streets are covered with ticker tape and torn-up newspapers. The flusher does a good job moving such trash.**

IN NEW YORK CITY

of automobiles registered in the city and the density of vehicular traffic preclude manual sweeping and demand that entirely new techniques be developed for handling the problem. Confronted with this condition, a new policy of sweeping all the paved streets by machine with the goal of treating the entire city by this method by the end of 1957 was adopted with the approval of Mayor Robert F. Wagner.

Planning The Program

Once the decision was reached to mechanize street cleaning, all facets of the problem were studied and examined to lay out the proper program for attack. The planning involved a study of the methods, equipment, personnel and operating procedures necessary for the establishment of a suitable scheme for carrying out machine sweeping and the preparation of a request for the necessary funds. Much of the necessary planning data had been obtained through previous investigations but considerable field work was necessary to fill in the voids. Street-by-street and, in some cases, block-by-block inspections were made for the purpose of determining the frequency, the time and the method of cleaning required in each area. The plan was based on present geographical subdivisions of the Department which comprise eight borough commands subdivided into fifty-seven districts, further subdivided into three to five sections per district. Districts were laid out primarily with refuse collection uppermost in the minds of the planners. Since both cleaning and collection are the joint responsibility of the district supervisor, sweeping routes as well as collection routes have been laid out on a district basis. However, in connection with main arteries such as highways which cross several districts, Borough Superintendents, for more efficient operation, exercise their prerogatives by disregarding the district boundaries in the layout of the sweeping routes involving these thoroughfares. In general, routes were established to eliminate as much lost time "deadheading" as possible.

The study encompassed the additional important factors such as types and quantity of material, types and required numbers of equipment, personnel and their classications and the economics of the machine sweeping scheme.

Categories of Street Refuse

Generally street refuse is divided into two categories: That which is inherent to our civilization and classified as unavoidable; and that which is the result of negligence or carelessness, and is avoidable. In the first category we have dirt such as caused by tire wear, soot, vehicle and pavement wear and erosion, dirt from street openings, leaves and branches of trees, and dirt from many other, mostly hidden, sources.

● **SWEEPERS are equipped with heavy-duty 100-hp industrial engines to provide the power necessary for work on steep grades. Hopper capacity is 3 cubic yards or more.**

Refuse of the second category, caused by negligence and carelessness on the part of the public, comprises mainly pedestrian litter such as paper, food and candy wrappings, fruit skins, spillage from overloaded or improperly loaded trucks, overloaded refuse cans or improperly wrapped household refuse set out for collection and illegally discarded trash or rubbish. It has been estimated that there are annually approximately 100,000,000 pounds of unavoidable refuse; and about 200,000,000 pounds of avoidable refuse found its way into the streets before the starting of the anti-litter campaign.

Having estimated the quantity of material to be handled, the next step was to determine the method of handling. Since no amount of equipment or personnel could properly cope with the avoidable dirt if public cooperation was lacking, the first phase of the campaign was directed toward securing public cooperation. This portion was described in an earlier article in this magazine.

In planning for machine operation the first step was to make a survey of the entire city to determine what treatment would have to be given to each and every street. This survey took into account the influence of many factors such as:

1—*Traffic Density.* An important planning consideration as heavy vehicular traffic interferes with cleaning operations and usually dictates that those streets so affected have to be cleaned at off-hours, primarily at night, when the traffic flow has subsided.

2—*Parking.* This is the most serious factor as the number of cars registered in the city and the shortage of garage and off-street parking space has resulted in an almost total occupancy of the curb by parked cars in many areas. In those areas a technique or method of denying the use of the curb for stated intervals has been evolved, to permit machine sweeping, known as the alternate side restricted parking plan.

3—*Type of Pavement and Curb.* Most of the streets of the city are paved with a smooth surface, either modern asphalt or concrete, but with some granite block, all of which can be cleaned easily and effectively by machine sweeping. Curbs of most of the streets are of uniform height and those uneven sections that do exist are not a great problem to machine sweeping. Some streets, however, have dirt gutters and no curbs.

4—*Topography.* The topography of the areas had to be considered in laying out sweeping routes in accordance with the existing elevations of the streets. For example, some steep grades militated against machine sweeping. Other topographical features considered were railway cuts, waterways, parks, stadiums, dead end streets and controlled routing.

5—*Character of Neighborhood.* The character of the district was taken into consideration in determining the type and frequency of sweeping operations. Market areas require special treatment, such as the hose flushing in connection with the Fulton Fish Market area. Churches and other houses of worship require special attention during holidays and other days of worship. Hotel and theatre districts require extra attention.

6—*Population.* The density and character of the population abutting the street was studied to determine the required type and frequency of service. Areas with high transient ratios require greater attention to pedestrian litter.

The above were the main factors which were taken into consideration in determining into which of three categories a particular street fitted. The categories were based on the method of cleaning to be employed, as described below.

Street Classification

Category A comprises those streets where the curb occupancy by parked cars required that regulations be adopted to prevent parking for the intervals necessary for street cleaning. Most of the residential areas of the city of high population density, consisting of multiple-type dwellings or apartments, fell into this class. It was necessary to institute alternate side restricted parking to free the curbs for machine sweeping. Included within this area are business streets occupied by stores and the like which are given an augmented service of manual litter picking in addition to the machine sweeping. The survey revealed approximately 4,200 curb miles of streets in Category A that could be machine cleaned and in addition 1,100 curb miles of business streets which would have to be manually litter patrolled.

● **FLUSHER in operation. United Nations Building in background. Standard tank is 2,500 gals.; mounts on 40,000-lb. GVW chassis which is also used for snow plowing.**

Category B comprises mainly business and commercial areas where traffic and parking problems interfere seriously with cleaning during the day and which were not adaptable to the alternate side restricted parking method. In those areas, because of the type of occupancy, there are periods, mainly at night, where machine sweeping is feasible. This cleaning operation is augmented during the day by a manual litter picking service. Typical areas in this category are the financial district, department store areas, garment manufacturing centers and ho-

Table 1—Machine Cleaning Mileage and Frequency

	Class A	Class B	Class C
Curb Miles	4,204.6	375.8	4,960.8
Daily	61.1	264.3	525.8
Nightly	.....	23.7	.....
Tri-weekly	4,143.5	63.0	2,000.6
Twice weekly	.....	34.8	1,596.6
Weekly	.....	.....	837.8
Litter Patrol	1,087.9	303.8	769.8

Table 2—Litter Patrol Frequency

	Class A	Class B	Class C
Five daily	.....	19.0	.....
Tri-daily	15.7	30.4	.....
Twice daily	149.1	93.5	2.4
Daily	573.5	160.9	363.0
Tri-weekly	349.6	.....	208.4
Twice weekly	.....	.....	72.1
Weekly	.....	.....	123.9

tel and theatrical sections where activity during the night or late at night diminishes so that night mechanical sweeping is feasible. The total number of curb miles assigned for night street sweeping was 376. Of this total, 304 miles will be given hand manual litter patrol service.

Category C is assigned to those streets in the less densely populated residential sections where mostly one and two-family houses are found. In these areas the curb occupancy by parked cars is low enough to permit machine sweeping either night or day without special traffic regulations. The total number of curb miles for machine sweeping in Category C is 4,960. Of this total 770 curb miles are local business streets which require manual litter picking during the day.

Tables 1 and 2 show the mileage and frequency of cleaning.

Because bumper-to-bumper parking extends throughout the day and night seven days a week in many areas of the city, the "alternate side restricted parking" program was instituted by the present Commissioner of Sanitation to meet the problem. In essence it consists of the promulgation and enforcement of parking regulations forbidding parking on one side of the street or avenue on Mondays, Wednesdays, and Fridays and on the other side of the street on the alternate days, Tuesdays, Thursdays and Saturdays. The interval has been shortened to a period of three hours. In half of the district this time extends from 8 o'clock until 11 a.m., and in the other half of the district from 11 a.m. to 2 p.m. This staggered arrangement permits more efficient use of the expensive power brooms enabling them to work both of these sessions.

Warning and Enforcement

Metal warning signs are posted throughout the area involved and the Police Department traffic personnel affix traffic tickets to illegally parked cars. Whereas normally this punitive measure would bring about only fair compliance, the fact that the Sanitation Department tows illegally parked cars to City pounds has brought about almost total compliance. Offenders, besides being liable to a $15. traffic fine for illegal parking, are required to pay a $10. towing charge plus storage charges of $1. a day after an initial 48-hour period has expired. During 1955 a total of 725 curb miles comprising 2,059 square blocks were added to the restricted streets increasing the total mileage to 1,650 curb miles covering 4,386 square blocks or approximately 40 percent of the total program. A request has been made for additional funds and equipment to complete the 4,200 curb miles in the program by the end of 1957.

● **POINTING to broom performance on street with one side clear of parked vehicles, Commissioner Mulrain, right, with Com'r. Wiley and Mr. Carroll, Engineer.**

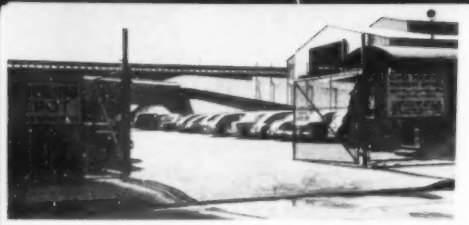
Since the plan was initiated, approximately 60,000 cars have been hauled by the 65 Department tow trucks to the eight pounds throughout the city. It was found that hundreds of owners did not bother to reclaim their cars, thus clogging the pound facilities. To alleviate this condition, proper legislation was enacted permitting the City to dispose of these cars by public auction after a waiting period of thirty days had elapsed and, in addition, granting the right to charge a fee for storage. Sixty-five hundred unreclaimed cars have been auctioned off for amounts ranging from $5 to several hundred dollars. Many incidents have arisen in connection with this operation, such as discovery of stolen vehicles, irregularities in ownership and discrepancies between engine and motor numbers, all adding complications to the otherwise simple act of vehicle redemption. Whatever balances remain after the City's expenses have been deducted from the amounts received at the auctions are held in escrow pending possible later appearance of the owner. The alternate parking scheme has proven successful and has contributed immeasurably to the improved appearance of the City's streets.

The major piece of equipment employed in sweeping is the motor operated mechanical street sweeper. The Department has experimented, tested out and utilized mechanical brooms for a number of years and has standardized on the large pick-up sweeper with dual gutter brooms and dual controls. This mechanical sweeper consists essentially of a 36-in. diameter pick up broom filled with palmyra fiber; two gutter brooms filled with steel spring wire; and a scraper conveyor for conveying the dirt to the hopper, which can be emptied mechanically. In addition a 170-gal. water tank and spray system lays the dust.

Heavy Duty Sweepers

Heavy duty, 100 horsepower, industrial engines are specified to give the necessary power for steep grades, acceleration and traffic speeds. The large hoppers, at least three cubic yards in capacity, are specified to keep the units at work for longer periods and cut the "downtime" involved in frequent trips to disposal points. With dual gutter brooms the units can sweep a swath 10 feet wide, effectively cleaning the portion of the street surface where most of the dirt collects. The brooms are easily maneuverable and are able to "snipe" in-between obstructions such as legally parked trucks, ambulances and the like. Brooms are designed to have a full floating pick

● **WITH sweeper demonstrating difficulty of cleaning under and around parked cars, Commissioner Mulrain explains his problems to Traffic Commr. T. A. Wiley.**



● **ONE OF the impounding depots for cars illegally parked on the wrong side.**

up, enabling the unit to ride over or into uneven portions of the pavement. The performance of the brooms is dependent upon the many traffic, topographical and other features mentioned previously. However, on the average, including servicing time, "deadheading" time and other non-productive time, we find that production averages 3½ gutter miles swept per hour and that in an 8-hour shift the range is from 10 miles to 15½ miles with an average of 12.3 miles. From two to four hopper loads of dirt are collected each shift depending upon the area in which the broom is operating.

Broom service is very severe and the brooms require constant maintenance to keep them in operation. The broom operator devotes one hour every day in the 8-hour shift to preventive maintenance of the unit. This consists mainly in checking to see if the lights are in working order, the windshield and mirrors are clean, brakes and horn work satisfactorily, the radiator is filled, tire pressure is correct, oil level up and gasoline tanks full, water level in the battery correct, of parts that require daily servicing are greased, washing down the unit and adjusting the brooms. Normally the spray on the brooms is used whenever the units are operating. However, when the temperature drops below freezing this operation is discontinued. At that time special attention must be paid to the radiator as occasionally dust is stirred up which tends to plug the air passages.

The pick up brooms are loaded with about 90 pounds of palmyra stock and the average service from each is 105 gutter miles. The broom cores are stripped and refilled in the Department's shops at an estimated cost for fiber, labor, material and other charges of $19 each. Central broom servicing depots have been located throughout the city for all but the major repairs which are performed at the Department's Central Repair Shop. At present we have 260 machine brooms on hand or on order.

Machine flushers constitute the second major piece of street cleaning equipment. Main elements of a machine flusher comprise a gasoline engine driven chassis, a water tank, a pump, piping and nozzle system. The booster pump is driven by means of a power take-off from the engine forcing water into a fan spray at high pressure at the nozzles, moving street dirt from the center of the street towards the gutters. The pump is of the single suction centrifugal type with a horizontal split casing having 4-in. suction and 3½-in. discharge, delivering 500 gallons per minute at 55 lbs. ppressure. Three flushing nozzles are mounted, one forward of the left front wheel and two forward of the rear wheels. The nozzles have an effective working distance of about 18 feet and are individually controlled from the cab of the flusher by means of the air operated control valves, permitting one man to operate the unit. The Department has utilized tanks of various sizes from 1,500 to 3,500 gallons but has standardized on the 2,500-gallon tank mounted on a 40,000-pound GVW chassis of the cab-over-engine type. The chassis specifications call for a rugged design in order that the unit can be used for snow plowing during the snow season.

● **BROOM repair and Maintenance is carried on at the Central Repair Shop.**

Street Flushing

Flushing operations usually precede machine street sweeping though often flushing is carried on without such street sweeping where the gutters do not have curbs and especially in the summertime where the object is to lay the dust and help cool off the streets rather than to trap litter. Flushers are operated at a speed of approximately 10 miles per hour and normally clean from 10 to 20 miles during an eight hour shift.

Supplementary equipment that is used for the machine sweeping operations consist of vacuum leaf loaders, tow trucks and litter patrol trucks.

Equipment Requirements—Major operating equipment to complete the New York City machine sweeping program includes 219 sweepers, 167 flushers and 170 tow trucks for Class A areas: 12 sweepers and 16 flushers for Class B areas; and 57 sweepers and 46 flushers for Class C streets. With a 25 percent allowance for spares, requirements total 360 sweepers, estimated to cost $2,884,680; spares allowance for flushers and tow trucks has been set at 20 percent and the totals needed at 275 flushers and 204 tow trucks, to cost, respectively, $3,314,850 and $665,000.

Traffic Signs—The alternate parking areas require traffic signs informing the public as to the days and hours of parking restrictions. These signs are of metal, mounted on existing light poles or pipe poles erected for that purpose. The estimated cost for completing the program is $1,895,000, based on 4204.6 curb miles x $450./curb mile.

Personnel for Equipment Maintenances—Personnel required to maintain the 360 sweepers, 276 flushers and 204 tow trucks is estimated at 156, with eleven different skills, and with an annual salary roll of $784,040. *Supplies,* including Palmyra stalks and steel wire for brooms and gas, oil and grease, estimated at 46.5 cents per gutter mile, are estimated at $1,106,352 annually. *Personnel and equipment housing* costs will be $734,000.

Capital and Annual Costs—The major capital costs for equipment and signs will be $8,760,000. Annual fixed costs will be $1,100,000. Personnel costs will amount to $14,453,000 per year, including the services of 505 sweeper, 401 flusher and 231 tow truck operators, and a manual litter patrol of 1,348 men. Supplies will amount to $1,110,000 and housing to $740,000 per year. The total annual costs will be $17,403,000. The present annual cost is about $10,000,000 and the balance of $7,000,000 has been asked for in the Departments' budget request for FY 1956-57.

Results have been gratifying; the appearance of the City has improved immeasurably. Mechanized Street Sanitation has proved to be feasible, efficient and economical. Results have justified the adoption of our course and its implementation is expected to make New York City one of the cleanest cities in the country.

Analysis of

PEAK WATER DEMANDS

JEROME B. WOLFF,
Deputy Chief, Bureau of Engineering,

and

JOHN F. LOOS,
Chief, Water Design Division,
Department of Public Works,
Baltimore County,
Towson, Maryland

ONE OF THE MOST perplexing problems facing the waterworks designer is that of forecasting with some degree of accuracy the peak demands in the water distribution system. Distribution systems must deliver to the consumer ample water at adequate pressure on the peak hour of the peak day in any year[1]. This statement is a contraction of the broader standard recently enunciated by Wolman[2].

"The water works industry should provide a service which is consistently and continuously available, even at peak demands and in anticipation of the requirements of expanding geographical areas. Such reasonable service must encompass the consumers' requirements for all modern water-using devices, including the growing demand for, and interest in, the use of water for gardening purposes. Such a specification by no means implies that the industry must accept wasteful uses of water, illegitimate diversions, inadequate payment, or unsound development of real estate."

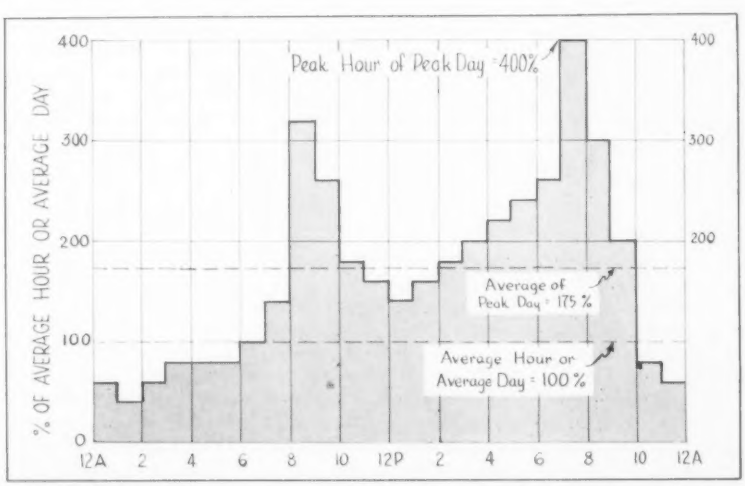
In Baltimore County and in many other municipalities it has been impossible to meet the rigid standard of providing all consumers with adequate supplies of water and satisfactory operating pressures on days of peak usage during drought periods. Financial considerations have made it necessary to inaugurate a system of restrictions on use because of lack of adequate facilities in the older portions of the water distribution system. These restrictions are commonplace and can be expected to remain for many years to come. It is not only obsolescence, aging of lines, and inadequate service charges which contribute to this situation; we have also to consider the effect on the existing systems of the phenomenal mushrooming of suburban areas around the periphery of old established city boundaries.

We will, for the sake of simplicity, assume here that there are no barriers, financial or otherwise, affecting the designer's final selection of the various elements of the distribution system. First, is there any fixed criteria which can be utilized in determining the necessary balance of pumping, pipe networks, and elevated storage or reservoirs to meet the most extreme demands on a system? The answer is obviously in the negative. One important factor in distribution system design is that it must be designed in stages to meet expanding population demands. At no point, then, except quite accidentally, will the assumed conditions exactly reflect those which actually occur in the operation of the completed system. Nor are any two systems alike, either in topographic conditions, type of populations, configuration of population with regard to the distribution system elements, or in the ratio of commercial or industrial to residential demands.

We can, therefore, see that although there are a number of generally accepted principles to guide the designer in selecting pipe sizes, storage capacities, and pumping capacities, he must evaluate carefully the unique factors in the particular system at hand so that he can satisfactorily supply the peak requirements on the peak day.

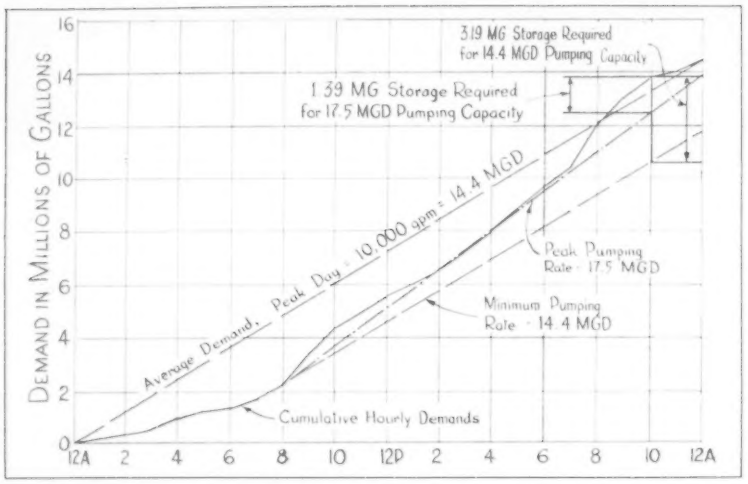
A comprehensive study has recently been completed on the water distribution system which serves Baltimore City, Baltimore County, Howard and Anne Arundel Counties in Maryland. Because of the tremendous diversity of demands which are experienced in the ten different pumping and gravity zones which serve a population of well over one and one-third million, a substantial amount of information has been obtained which can be of use to the water-works designer.

In the Baltimore study, it was found that the average daily consumption in 1953 varied from 234 gpcd in mixed residential and industrial neighborhoods to 80 gpcd in the exclusively residential neighborhoods. For the same areas, the percentage ratio of peak hour to average day was only 150 for the industrial areas, but reached 376 for the predominantly residential Towson area in Baltimore County. The percentage ratio of 376 was indicative of the relationship of peak hour to average day in a diversified area having a population of approximately 38,000 persons. When consumption for only a portion of this popu-



● **HYDROGRAPH of water demands, Figure 1, from study of pumping and storage elevations, shows peak hour, average of peak day and average day water demands.**

A paper presented at the Twenty-Eighth Annual Conference of the Maryland-Delaware Water and Sewage Assn., with additional data from Mr. Wolff.



● **MASS curve analysis, Fig. 2, for proposed Towson Fourth Zone distribution system indicates cumulative hourly demands and storage for 14.4 MGD pump capacity.**

lation is considered, as is the case when studying individual transmission mains, the percentage ratio of peak hour to average day may be substantially higher.

Sufficient information was obtained from pumping and storage elevation records in the various zones to obtain mass curves of demands during maximum days. From these mass curves and an examination of pumpage, it was possible to determine the effect of elevated storage on the system.

On Figure 1 there is given the hydrograph of water demands and on Figure 2 the resulting mass curve analysis for the proposed ultimate Towson Fourth Zone water disribution system is shown. A system peak of 400 percent of average hour was assumed in these studies. A number of trials of these curves showed that the data derived by Burdick[3] and Howson[4] was quite satisfactory, and for the purpose of establishing a design criteria for storage, it was decided to provide tank storage to meet daily fluctuations in an amount equal to 20 percent of the maximum daily consumption[1]. Of course, the latter provision is for daily fluctuations only.

Provision of fire storage capacity should be determined by the designer on the basis of protection requirements as well as economics. It is usually well to add a certain amount of fire storage capacity to the elevated tanks which is above that required for daily fluctuations.

A recent paper by G. C. Schmid[5] has indicated that storage requirements can reach 26 percent of the maximum daily demands. The Southeastern Oakland County Water Authority, Royal Oak, Michigan, has designed their water works system to meet this latter criterion.

In reviewing or designing any water distribution system, three conditions of demand must be studied: (1) peak daily demands; (2) the capability of the system to refill the storage reservoirs during off-peak demand periods; and (3) peak hourly demands.

In examining the capability of the various portions of the distribution system to meet peak demands, it is necessary to make extensive and often tedious computations utilizing the Hardy-Cross method of successive approximations. This cannot be avoided unless the municipality or consulting office is fortunate enough to have an electric distribution network analyzer, such as was recently purchased by the City of Baltimore.

Peak Daily Demands and Reservoir Filling

A careful study of peak daily demands together with the system requirements for reservoir filling will establish the proper design points for the pumps. Ordinarily, it is expected that the pumpage in the system will be sufficient to meet the peak daily demands. Thus, the assumption is made that the maximum daily flows will be supplied by the pumps, and the hourly peaks will be supplied from storage.

To make this assumption valid, it is essential that the storage reservoirs or tanks be so located that they will make their contribution to system demands when they are called upon. Of necessity, they must have received sufficient water from pumping during off-peak periods to meet the next sequence of peak drafts. To do so, the transmission mains which connect the pumping stations to the reservoirs must be of sufficient size to carry the requisite amount of water into storage without causing inordinately high system pressures. This problem becomes of great importance where the tank is located remotely from the pumping source.

It is the filling conditions which impose the severest burden where long transmission mains connect the pumping station to the elevated storage reservoirs or tanks. It is here, too, that all of the peculiarities of the individual systems are accentuated. If the demand center lies between the tank and the pumps, the transmission main has the double burden of sustaining off-peak demands as well as carrying the large flows from the pumps to the tank. If the transmission main is extremely long, the usual result is that large diameter lines having low velocities will be required. Otherwise, excessive system pressures will prevail near the pumps, and additional allowance must be made for friction losses in the long lines.

On Figures 3 and 4 there are given the tank filling, peak day, and peak hour of peak day system friction curves and there are shown Points A, B and C on the pumping and friction curve intersections which indicate the operating pressures at the station. On Figure 4 there is a reproduction of the same points on a hydraulic gradient profile as reflected in the system to the Timonium Tank. It can be seen that for this system the tank filling imposes the highest pressure, the peak day pumping the next highest pressure, and the peak hour demands cause the lowest pressure conditions. The effect of this variation in pressure on the system is shown in Figure 4, where it can be seen that the gradient during the peak hour with the tank and pump discharging is as much as 30 pounds below the pressure experienced during the other two pumping conditions. This variation in pressure during extreme peak conditions is by no means unusual.

In recent studies, it has been found that pump selection based on maximum daily flows into the system alone, without considering the system conditions resulting from reservoir filling, has led to the installation of pumps which have design points that are too low. As a consequence, inadequate amounts of water are delivered into storage at unexpectedly high system pressures. It is clear then, that a thorough

Table 1—Survey of Peak Demands in Residential Neighborhoods

Lot Size sq. ft.	Neighborhood	Number of Dwellings	Population	Peak Daily* from Test gpcpd	Peak Hourly from Test gpcpd	Ratio Peak Hr. to Peak Day percent	Avg. Daily by Record gpcpd	Ratio Peak Hr. to Average Day percent
5,000	Older	44	153	70	310	450%	60	520%
7,200	....	41	143	304	1190	392	84	1420
17,400	New	40	138	156	1210	780	94	1290
26,000	New	16	57	461	1870	405	95	1970

*Peak Daily, compiled from test data, is actually average daily consumption during the eight-day test.

analysis of peak day demands as well as tank or reservoir filling conditions, are essential in the review or design of a distribution system.

Peak Hourly Demands

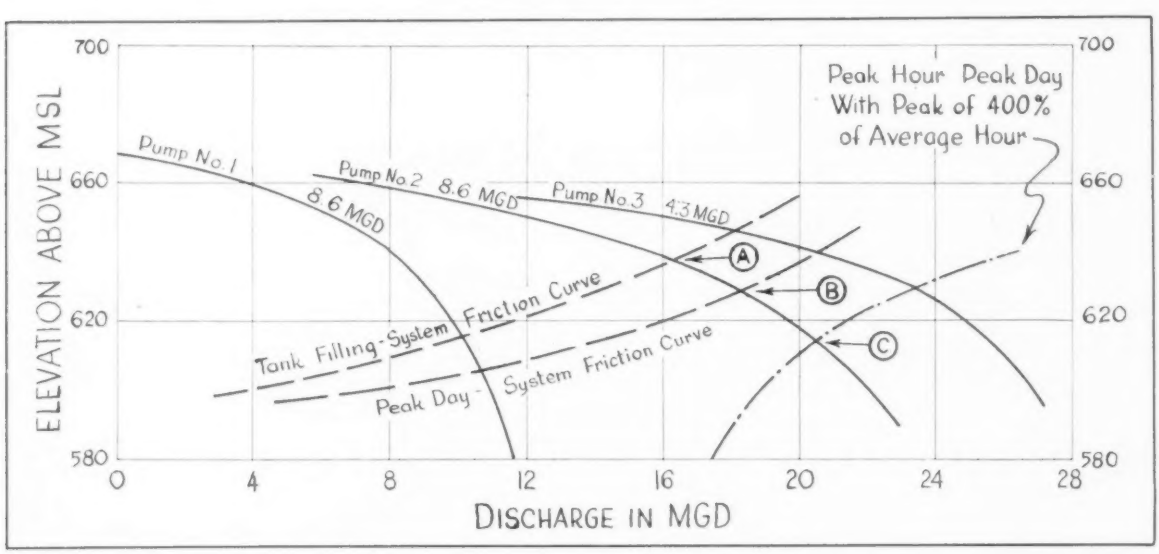
The investigation of the effect of peak hourly demands on the system is the most difficult study. In peak daily demand analysis the assumption usually made is that the gradient is at or above the reservoir or tank level. The necessary assumption made in the peak hourly study is that the reservoir is discharging from some intermediate level (not necessarily full) and that the pumps are discharging from some point fairly low on their discharge curves. It is obvious that a number of trials will be necessary to establish the operating point on the pumping curve. We have concluded after many studies that the major function of the peak hourly analysis is to assist in determining whether the gradients in the system fall so low that sufficient pressures will not be maintained in the system during the most critical hours.

In the portions of the system which lie between the pumping station and the storage area, or are well within the zone of influence of adequately sized transmission mains, no problem is experienced in designing the system for extreme peak hourly demands. It is in providing supply to areas which are a considerable distance from the main transmission lines that serious difficulty has been experienced in meeting maximum hourly demands; and it is in the design of distribution mains which furnish water to suburban communities having a high degree of residential development that the problem of selecting a proper design criteria has become acute.

Because of its interest in obtaining information on the magnitude of peak hourly demands, Baltimore County in July and August of 1954 made a comprehensive survey of peak demands in various types of residential neighborhoods. These data were obtained during the course of a severe drought. While a sprinkling ban was imposed on the remainder of the County and Baltimore City, the water use restrictions were removed in several neighborhood areas which were designated for the survey. The developments examined had lots varying in size from 5000 square feet to approximately one-half acre and were located in different portions of the water distribution system. Although the sampling of the areas investigated is obviously insufficient from which to draw dependable design criteria, the information is considered provocative enough to present, with the hope that other municipalities will obtain hourly studies and present them for publication so that a satisfactory design standard can be evolved for suburban areas which are growing throughout the country.

Table 1 lists the results of an eight-day test of four types of housing developments.

Recent published data have served to indicate that the demands shown in Table 1 do not greatly exaggerate the magnitude of peak hourly flows. In the January, 1955, Journal of the AWWA[9], Tanghe described the



● TANK filling, Fig. 3, peak day and peak hour of peak day friction curves. A, B, C indicate station operating pressures.

Table 2—Peak Demand Ratios

Neighborhood	Percent Peak Day Over Average Day
Older Neighborhoods well settled small lots	500-600
New Neighborhoods average size lots (¼ to ½ acre)	900
New & Old Neighborhoods large lots (½ to 3 acres)	1500

procedures used by the City of Milwaukee in meeting peak demands. Of particular interest was his table which indicated suburban residential peak daily demands of 300 percent of the average day, and instantaneous rates of demand (presumably 1 or 2 hours) which varied from 900 percent of the average day for unrestricted use and 600 percent of the average day for restricted use. The term "restricted" referred to the use of sprinkling bans on opposite sides of the street on alternate weekdays.

An article by Alfred E. Hansen, titled "Pressure Records" in the February 1955 issue of the Journal of the AWWA[7] lends weight to the Baltimore County 1954 results. He stated that in a number of suburban developments he has found that the range in maximum demands is 3 to 5 times the average daily demand, but that in high-type residential areas, where as is now generally conceded, the lawn sprinkling demands impose the most critical load, the peak hourly demand was 15 times the average flow on the basis of flow and pressure recordings.

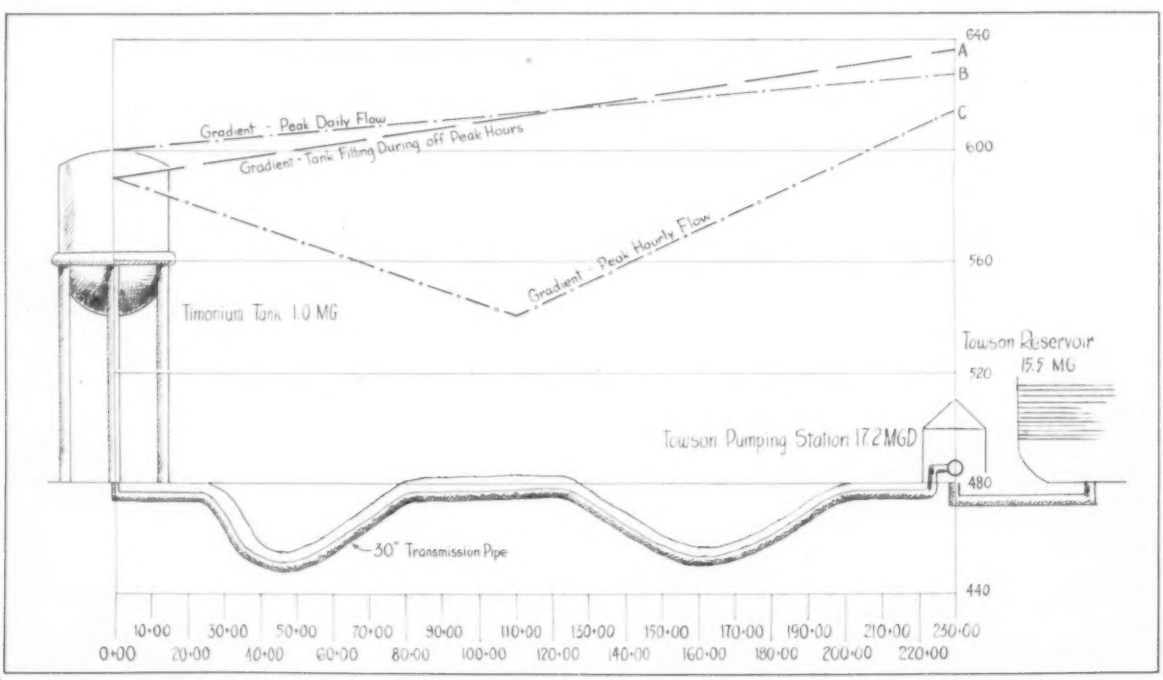
On the basis of current information Table 2 shows the per capita demands as a percentage ratio in terms of average daily demand. These loads are suggested for suburban distribution system design in connection with peak hourly studies.

It is clear that our understanding of the magnitude of peak hourly flows will lead to changes in design criteria, particularly in the portions of water distribution systems serving suburban communities having little or no commercial or industrial development. These latter demands serve to damp out extraordinary peaks.

Some information has been presented in recent publications which indicates that the extremely high peaks experienced in new developments having large individual lots are transitory in nature. There is a belief that as lawn areas become well established the need for vast amounts of continual sprinkling through hot and dry periods gradually diminishes. It would appear that accumulation of quantitative data of this nature will be rather difficult to obtain, particularly since the developments in adjacent areas vary markedly in size and density. There has been some indication that several eastern private water companies have adjusted rates to allow for the diminution in demands as the developments mature. If this characteristic can be borne out by quantitative evaluation, such data can be of great assistance in designing for those areas which are showing sharp and dramatic increases in population.

For example, if we were to assume that the high peaking characteristics of a given area which now indicate peaks nine times above average daily demands will ultimately experience reductions in maximum hourly demands of from 30 to 40 percent, there is some possibility of overdesign of line sizes on the basis of critical peaks recorded in Table 2. This raises the question as to whether the imposition of lawn sprinkling bans and other water use restrictions cannot be considered as a temporary expedient in fast growing communities which will be removed as these developments mature.

Several test areas in Baltimore County have been analyzed utilizing the design criteria suggested in Table 2. It has been found that we cannot assume that sizing of mains to satisfy N.B.F.U. fire demands is sufficient for peak hourly demands. Application of the per capita demands indicated above has shown that in several instances, feeder mains as well as interior loops must



● **FIGURE 4 shows same points as are indicated in Fig. 3 on the preceding page as reflected in system to Timonium Tank.**

be increased in size to maintain satisfactory pressure in areas not close to transmission mains.

It also appears that a much higher degree of care must be utilized in the design of house water services—which is so much a prosaic and routine matter to the designer of the housing development that he frequently ignores the problem and leaves it to the builder or developer. The result is that the extreme lowering of system pressures during peak flows is aggravated by excessive friction losses in the individual homes.

Conclusion

It was stated earlier that the assumption in this discussion was that there were no financial problems which barred the designer from attempting to reach the appealing goal of ample water at all times for everyone. For the present, resort must be had to water use restrictions and earnest appeal to the using public to restrain wasteful use of water during the peak demand periods. All communities are striving toward the goal of providing adequate water service. Because so many existing distribution systems are being extended farther and farther to meet the suburban areas, and because the variations in demand are increasing, it will be the height of wisdom for the designers to design with liberality—they will never regret it.

References

1. Geyer, John C. and Wolff, Jerome B. Report to the Bureau of Water Supply, Department of Public Works, City of Baltimore, on the Water Distribution System and Appurtenant Problems, July 1, 1955.
2. Wolman, Abel—Reasonable Water Service, Journal AWWA, Vol. 47, No. 1, January, 1955.
3. Burdick, C. E.—Storage In The Distribution System, Water and Sewage Works, April, 1952.
4. Howson, L. R.—The Distribution System, Water and Sewage Works, April, 1952.
5. Schmid, G. C.—Peak Demand Storage, Journal AWWA, Vol. 48, No. 4, April, 1956.
6. Tanghe, E. F.—Meeting Milwaukee Peak Demands, Journal AWWA, Vol. 47, No. 1, January, 1955.
7. Hansen, A. E.—Pressure Records, Journal AWWA, February, 1955.

SEWER CONSTRUCTION METHODS IN WET AND SOFT GROUND

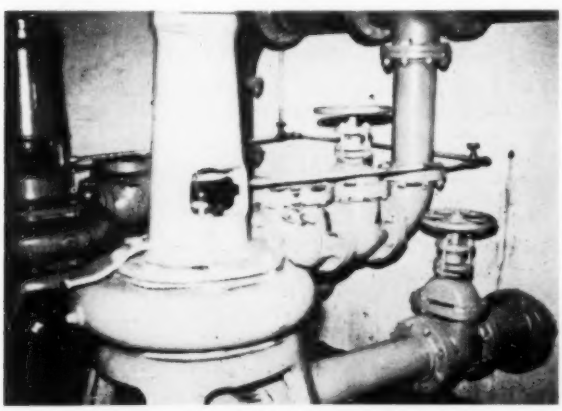
From data by Edward H. Finster,
Boyle Engineering,
Santa Ana, California

COMPRISING an area of only 250 acres, the Midway City Sanitary District was formed some years ago to provide a basic need of the population — garbage and trash collection. In 1950, the District and the adjoining communities of Westminster and Barber City realized the necessity for constructing a Sanitary Sewer system. After careful study, it was deemed best to annex these other communities to the existing District. This step increased the area about five times.

Following the annexation, construction plans were prepared by Boyle Engineering with financing by advance funds from the Federal Government. These funds were repaid by the District following the sale of a general obligation bond issue.

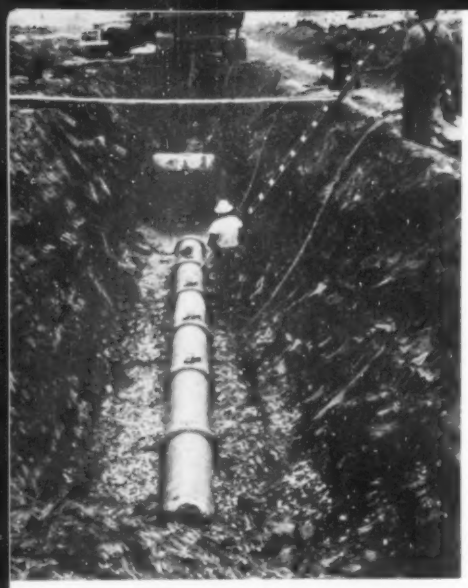
Due to the known existing ground water conditions within the District, the project was advertised several times before successful bids were received. The final course of action taken by the District was to break the construction of the entire project into four separate contracts as follows: (1) Pumping station; (2) force main; (3) intercepting sewer; and (4) service sewers. The total cost of the combined project was approximately $1,300,000.

The trenching equipment used in the course of construction of the service sewers included trenchers, backhoe and dragline. Due to the ground water conditions, as mentioned previously, and existing soil



● **PUMPING stations, placed entirely below ground, have dual pump units and equipment for automatic alternation.**

● **TRENCHING shield had to be used, followed closely by tight timber sheeting due to unstable nature of the soil.**



● **PIPE was bedded in crushed stone which was fed into trench by shield.**

conditions, it was necessary for the contractor to construct a large portion of the sewers with the aid of a shield which was followed by tight timber sheeting. The shield, which was placed with the aid of hydraulic rams, also fed variable amounts of rock into the bottom of the trench which was necessary for bedding and drainage. Without the aid of this shield the completion of the job would have been almost impossible, inasmuch as the soil in many areas was of such nature that the banks would not stand up on depths greater than about 3 ft.

The force mains serving the pumping stations were constructed of welded steel pipe with lapped joints, double dipped and wrapped to provide protection.

The pumping stations were designed and placed entirely beneath ground in public rights-of-way or easements obtained by the District. There was only a stair well opening to the surface of the ground. These stations were designed with dual pumps with automatic alternation equipment. The wet wells and dry wells were completely separated with no physical connection between them, thus eliminating the possible flooding of the dry well due to possible failure of the electrical or pumping equipment.

The metering station used to serve the District comprises a Parshall flume constructed as a part of the principal pumping station of the District through which 100 percent of the flow of the District must pass. The metering structure is connected to the wet well only and the water levels within the flume are transmitted by the use of an electrical impulse to a recording device installed within the dry well of the pumping station. The transmitter and recorder were furnished by Builders-Providence and the recorder includes a 7-day chart with a totalizer.

During the course of construction, the contractor tried many methods of handling the exceedingly high inflow of ground water and silt. Such methods included large open cuts; the installation of well-points; the installation of sheeting; and the use of large quantities of rock bedding which also served as underdrainage. After trying these methods, the use of the shield followed by tight sheeting proved to be the most satisfactory method for handling the adverse conditions encountered.

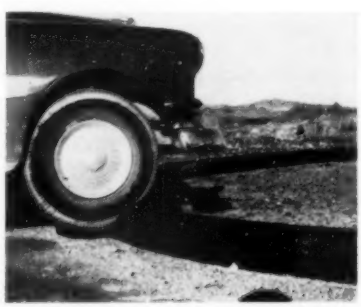
Following the laying of the pipe, backfill was tamped around the pipe and the balance of the trench was filled with the use of a skip-loader.

During the construction, the surfacing of many of the streets was lost in its entirety prior to the use of the shield. By special arrangement made by the District with the Orange County Road Department, the contractor paid to the County Road Department sufficient funds to cover the cost of the damaged surfacing. These moneys, along with additional amounts furnished by Orange County were used to reconstruct the streets within the District.

BUILDING CURBS
with Asphaltic Hot-Mix

Through the use of modern curb placing machines, asphaltic curbs, with or without gutters, may be constructed quickly from a heavy-duty asphaltic hot-mix. They give excellent service at highway intersections, along median strips, as part of traffic safety islands, on city and residential streets and in parking areas. Curb placing machines can be equipped to mold the asphaltic mixture into a variety of shapes and forms, satisfying most requirements or specifications. This type of curb is durable and has demonstrated its ability to withstand heavy abuse. Ice-melting chemicals have no effect and the curbing requires little or no maintenance. Combination curb and gutter installations have performed well under conditions of high water, velocity and weathering.

Construction of asphaltic curbs is remarkably fast and efficient; costs are said to range from about 50¢ to 70¢ per lineal foot. The new curb placing machines obviate the need for forms in curb construction and can place more than 2,000 feet of curbing per day.



● **ASPHALT curb used for a parking area is shown right, above. Below is a machine placing an asphalt curb on a Kansas highway. Photographs are from Asphalt Institute.**

COUNTY MAKES YEAR-ROUND PREPARATIONS *for* BATTLE *with* SNOW

ROBERT T. CARRIER

Genesee County Highway Superintendent, Batavia, New York

OUR WINTER season is from November through March and sometimes to early April. The snow fall varies from 95 to 115 inches, with temperatures below freezing most of the time; December, January and February have many sub-zero days. During a 24-hour period several conditions may exist: 0° in the early morning hours; near freezing with snow to above freezing, and then down again to freezing and below in the late afternoon or evening hours. Each condition and combination of conditions require a different type of treatment, dependent upon traffic in the particular locality. These conditions can and do occur considerably faster than we are economically able efficently to combat them separately.

In addition to the State roads, there are 255 miles of County and 410 miles of Township roads. The public highways in New York State are divided by law into three separate divisions: State, County, and Town, each unit responsible for construction and maintenance of its own system. In 1946, the highway law was revised making it possible for a county to contract with the State Department of Public Works for snow and ice control on the State roads within their bounds. The Department of Public Works devised a very workable contract, allowing several options of administrative and operational possibilities. Therefore, throughout the state there are several methods of administration and operation, the Board of Supervisors of each county determining which is the most economical and feasible.

In our County the Board determined that it was best for the County to be responsible for the State system, and for the Towns to be responsible for the County and Town highways within their own limits. We have so operated since the inception of the program in 1946 but many changes have been made in the type of equipment and the method of operation. Our equipment now consists of 13 heavy duty or 10-ton trucks equipped with side plows, 12-foot wings and tail-gate type sanders; four heavy duty four-wheel-drive trucks with plow and wing; three rotary truck plows; four cars for foremen; five two-ton dump trucks, equipped to spread dry chemicals; one service truck, with air compressor for driving air tools, burning torches etc.; and one fuel and service truck. All but the heavy duty four-wheel-drive and rotary plow trucks are equipped with radio. Also available are a Gradall, which we find a great help in cutting off banks after winging or rotary plow operation, and two graders used only for emergency ice removal.

All equipment is housed in our main shop in Batavia which is adjacent to our office where our radio base station is located.

Our responsibility during the winter season is primarily snow and ice control on State highways. However, work must be provided for the crews when they are not occupied with that job. Therefore, we plan work such as preliminary grading on new rights - of - way; cleaning fence lines; hauling stock such as stone and gravel for summer work; and jobs that can be started in the winter and finished the next construction season. As we are a small county, we try to make one piece of equipment do several jobs. Our snow and ice control attachments are interchangeable from one truck to another. Blade type plows can be switched with V type if the need arises; sanders are interchangeable from truck to truck if necessary, and can be replaced with the regular dump tail-gate in a matter of a few minutes. We have found this a very good arrangement. Winters prior to the past one have been comparatively light, allowing us to do clean-up jobs on fences and grading work on new rights - of - way. However, this past season, continuous falls of snow nearly eliminated such work. This planning and work allows us to retain the same crew on a yearly basis, which we feel makes for a better and more efficient operation.

Work Starts in May

The operation starts about May when plows and sanders are being taken off, cleaned and painted prior to storage. The increased use of chemicals has added to the corrosion problem and to store a plow or sander for the summer without cleaning and painting is inviting trouble. We use a steam cleaner for cleaning hitches, mold boards, blades, and all parts of sanding equipment; then we apply a rust preventive and paint. During this procedure, weaknesses in the equipment are found and repaired. If parts not in stock are needed, the

● **WINGS are stored for the summer after painting with rust preventive.**

equipment is set aside until parts are received, then repaired and stored. At the same time an inventory of blade stock, sander parts, hydraulic hoses, etc., is made and compared with what we expect, from past experience, to use in the forthcoming season and an order placed for the needed stock.

During late August and September, while the ground is dry, we move our crushing equipment to the pit where our abrasives are obtained. We are fortunate in having a nearly ideal pit, a minimum of small stone and a very clean and coarse hard sand. Our winter supply of abrasives is stockpiled, using a portable continuous crusher, bulldozer, shovel and one truck. We stock approximately 15,000 tons at the pit for a season. This is drawn to our central stockpile where it is mixed, using one part salt to three parts sand. Our bulk salt is obtained from a nearby mine and stocked adjacent to the sand for the mixing process. The trucking and mixing are done at odd times, when equipment and manpower are available from our fall work. Until late November, we plan to keep only about two days' amount mixed ahead; from December through mid-March about four days', then back to the two days' stock. We have found this eliminates a soggy material yet allows the brine to dampen the sand particles.

During the early part of October, the job of mounting the winter equipment on the trucks starts. The shop maintenance crews give the trucks a thorough check and, if needed, an overhaul. As the winter equipment goes on, it receives a careful inspection, although in most cases the repairs have been made the past spring. A truck, when fully equipped with lights, plow, wing, chains, warning lights and sanding equipment, is given a trial run and then returned to the shop and put back to work until the first storm of the season strikes. An experienced two-man crew can thereafter ready their truck for snow or ice control, fully equipped, in less than half an hour on the average.

Administration

Meanwhile, the administrative forces are setting up their crews, getting the telephone lists in order and working up the many details which provides for a smooth operation. The general foreman is in charge of all the work. Our county is small; it is divided into four sections; and a foreman is placed in charge of each section from November 15 through April 1. He is allocated specific pieces of equipment and operators for snow and ice control, all other work becoming secondary. As our weather conditions vary, even in this small area, each foreman has a free hand in the placement of the men and equipment allocated to him. The general foreman must get his permission before a piece of equipment or operator can be assigned to other work. We found this necessary, particularly in cases where crews were called at perhaps 3 o'clock in the morning, and when putting away their equipment in the afternoon, after completing their assignments, they would be asked to make another run. After 12 to 15 hours on snow and ice equipment, operator efficiency is bound to be low. Today's traffic under winter driving conditions requires a wide-awake operator.

Two-way radio has become one of our more valuable tools. The immediate control of equipment by the foreman, while both he and the equipment are on the road, aids greatly in the work; and, as all messages are heard at the base station, the administration has knowledge of operations in the various sections and is able to get a pretty good picture of road conditions. Transferring of equipment from section to section in an emergency is made possible. Our local news-

● **SHOP crew changing a wing blade during a heavy snow storm with a power tool. Mechanics are always on duty at the garage when the snow equipment is on the road.**

● **RADIO plays an important role in fighting snow in Genesee County. Radio operator Magee is shown in the radio room where the dispatching of trucks take place.**

paper and radio station contact our office several times a day and in case of dangerous driving conditions have co-operated with us in advising the public. In cases of traffic accidents, our radio equipment has been useful in getting immediate medical and police assistance. During traffic tie-ups, which occasionally occur, we co-operate with the state police and local law enforcement agencies through radio and telephone, although we are not on the same frequencies.

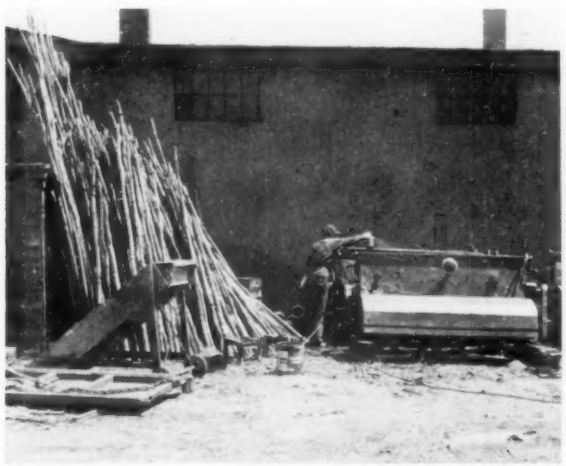
Pay for the Work

In order to receive payment for our work, the state has compiled a uniform system of accounting as to time and bookkeeping. Our engineering staff becomes part-time bookkeepers starting November 1 and continuing as such through April 15. Necessarily, time-keeping starts with the truck operator who must keep his and his helper's time, also the equipment time, mileage, routes worked on, and materials used. This must be compiled and broken down into the various items, then posted and balanced. The operators do a very good job, but if it wasn't for our radio system, our daily reports would seldom be completed. We have developed forms and run them on our duplicator which assist us in these breakdowns. The final typing of payrolls and posting is accomplished in our office.

From November to April, we maintain 24-hour service. The night watch is one of the more important jobs. From the time the mechanics leave at 11:00 p.m., till he is relieved at 6:00 a.m., he is on his own. At the first indication of the trouble, either from his observation of the weather at our central shop or by calls from state police patrol units on the road, he either sets our operations in motion, or allows traffic to stall. In case of a storm, his first calls are to the section foremen who start immediate patrol of their section and by radio are in contact with him. He then calls for requested operators and dispatches equipment upon their arrival. During the early part of the season we sometimes have had so-called dry runs as it has been our policy to start early to prevent accident hazards and accumulation of snow. These tests, however, serve a useful purpose in that they keep the crew alerted, give the equipment an additional check and bring to the members of the force the importance of their job. After the equipment is on the road all crews are in radio contact with the foremen. The importance of the night man in our small county cannot be underestimated as he sets in motion several hundred thousand dollars worth of equipment and man power, the extent of its use dependent on how early they get there. A traffic snarl on any of our main routes means several miles of traffic tied up with potential property damage, personal injuries, and certain slow-down of our equipment. With abrasives spread at the right time and snow equipment on the job, a smooth flow of traffic can be maintained even in heavy snow falls.

Because of the changing conditions that prevail, no one method has been devised by which all conditions can be met. We have, therefore, tried to compromise, not only as to equipment, but also as to materials. Because the roads are generally free from ice or snow at the beginning of a storm, traffic packs the first couple of inches to ice. We therefore, must provide abrasives for traction. From storm to storm, we have seldom been able to maintain enough of a film of chemical on the pavement to prevent this initial packing. If the storm persists, we may get from 8 to 15 inches of snow in a 12-hour period; we plow, then sand, as needed, until the storm ends. Each storm presents a different problem in the use of abrasive materials, equipment and man power. At the completion of the storm, with the pavement as nearly bare as chemicals and temperatures will allow, the job of winging the snow back beyond the shoulders is completed. This provides storage area for the next storm, and allows for drainage in case of a rise in temperature. Where snow has been piled high on the prevailing wind side of the road, these banks are lowered, using the Gradall to pull them down and a Sno-go to blow it to the other side or load it out. It is also necessary to load the accumulated snow from the business district of several small communities, or be faced with a traffic bottle neck.

When temperatures drop much below 20° the melting action of our mixed abrasives nearly stops. However, because the dampened particles and abrasives become imbedded in the ice by traffic some traction is retained, and upon a temperature rise, melting starts again. We use clear rock salt at the busier intersections and through some villages and calcium chloride when temperatures go lower than 15°, spreading it with the small trucks.



● **POLES against the building are used to identify lines of guard rail posts which become buried in winged back snow.**

● **LOADING snow with a Sno-Go equipped with a loader in a small village. A grader is used to pull snow into windrows.**

AKRON Uses "PERMANENT DUST TREATMENT" on UNPAVED STREETS

H. A. MATHEWS,

Office Manager, Division of Highway Maintenance, Akron, Ohio

● TYPE of street considered ideal for permanent dust treatment. Previous dust treatments have built up solid asphaltic mat; gutters provide adequate drainage.

WITH A ROADWAY network of approximately 800 miles of street, Akron is unique among cities of comparative size and population in that one-half—or 400 miles—of its streets are unpaved. These unpaved streets present a major maintenance problem, since many of them bear heavy traffic and are located in densely populated areas. Experience has proven that their maintenance cost—including cindering; graveling; blading; cleaning ditches, culverts and drains; repairing washouts; controlling erosion; patching; and the city's portion of dust treatment expenditures—equals the cost of maintaining all paved streets within the city.

This would make it appear that little would be gained in the way of reduced maintenance costs if all streets within the city were paved. Yet such is not the case. Akron, like most other cities, is hampered by the unavailability of maintenance funds. Too, many of its pavements are over voting age—designed for horse and buggy traffic—and should receive extensive resurfacing to prevent complete deterioration and excessive future maintenance. However, due to expenditures on unpaved streets, the proper maintenance measures on paved streets has, in many cases and of necessity, been delayed or postponed.

Engineers guiding the city's maintenance programs have long realized the necessity of reducing expenditures on unpaved streets to better protect the city's investment in pavements. In appraising the city's unpaved street problem, the engineers found a sizeable number of streets which had been treated in successive years with bituminous dust palliatives. A hard, solid asphaltic mat had formed on the surface of these streets, thus reducing their maintenance to a minimum. Sooner or later, however, these streets would break up, at which time they would again be given bituminous dust treatment.

If some economical method could be found for preserving the surface of these streets, it was felt that the unpaved street problem in the city might be solved to some extent.

In 1949 the late Robert Willems, Superintendent and Engineer of

● DISTRIBUTOR applies asphalt emulsion as one step in permanent dust treatment.

Akron's Division of Highway Maintenance, and his assistant engineer, F. W. Stouffer, began work on the project. The solution proved amazingly simple. For many years the division had been performing superior surface treatment operations on paved streets, using asphalt emulsion, AE-14, and slag. Why not try the same type of treatment on these higher-type unpaved streets as had been successful elsewhere?

Experimental Treatment

Two streets in the city were chosen to receive the experimental treatment. Both had received several applications of bituminous dust treatment during past years; both possessed a hard surface mat of asphalt; and both were heavily traveled. If the new type of treatment proved successful on these two streets, then it should prove successful on all similar streets within the city.

The experimental treatment, it was decided, would consist of a double seal—each seal consisting of the application of 0.25 gallon of asphalt emulsion, AE-14, per square yard, followed by the application of 26 pounds of No. 6 slag per square yard. Tandem rollers would be used to imbed the slag thoroughly, after which a fog coat of asphalt emulsion, AE-15, would be applied to complete the job. The fog coat would prevent the slag from being kicked loose by traffic, eliminate clean-up work, and prevent dust.

Since success of the experimental treatment was uncertain, a waiting period followed, during which time the two experimental streets were kept under constant observation. A few holes developed from time to time, but both streets seemed to hold up amazingly well.

In 1951, after the untimely death of Mr. Willems, W. H. "Dinty" Moore was appointed to head up the division. Moore, too, was quick to see the problem presented by the city's multitude of unpaved streets, and was equally determined to solve the problem. He agreed that the double seal treatment might prove to be the most economical solution.

However, there were several hurdles to be overcome. For one thing, bituminous dust treatment had been performed by city forces for many years, with the property owner benefited being assessed for only half the actual cost, or 20¢ per front foot. The new treatment would cost $1.25 per front foot, with the entire expense being borne by the property owners, since the city would be unable to provide matching funds. Too, bituminous dust treatment had in the past been accomplished on blanket resolution, whereas the new treatment would have to be done on petition only. Further, in order to interest property owners in the more expensive treatment, the work would have to be guaranteed for a period of several years, to insure that their expense per year would be little, if any greater, than in the past.

How All Benefit

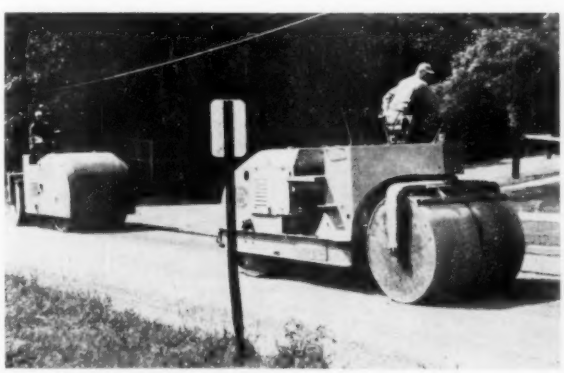
A system was finally worked out whereby both the property owner and the city would benefit from the treatment. Interested persons would apply for the treatment at the division's offices. The applications would then be forwarded to a district superintendent, who would inspect the street for suitability of the new treatment. If the street proved to be suitable for the treatment — that is, if it possessed a hard mat of asphalt surface, was at proper ordinance grade, and had proper drainage — a petition would be issued. If it proved upon inspection to be unsuited for the treatment, the applicant would be so informed. However, in cases where the street was deemed unsuitable for the treatment due to insufficient asphalt content, the street would be added to the regular dust treatment program, so that it might be made suitable in the future. The work would be assessed against property owners at the rate of $1.25 per front foot, with the work guaranteed for a period of five years. Thus the new treatment would cost the property owner about the same as ordinary bituminous dust treatment, if the job lasted only five years. If, on the other hand, the treatment proved to have a life in excess of the five-year period, the property owner would benefit accordingly. The city, too, would benefit through reduced maintenance costs.

To differentiate between the new treatment and a pavement, the name of "Permanent Dust Treatment" was adopted for the new treatment.

The two streets given the treatment in 1949 are still in excellent condition. Thus it seems fairly certain that streets receiving the treatment will stand up under ordinary traffic for seven years or longer. The division treated 4.17 miles of streets by this method in 1953; an additional 8.75 miles in 1954; and an additional 9 miles in 1955. At this rate, of course, it would be forty years before all unpaved streets in the city could receive the treatment. However, it seems a certainty that, due to success of the treatment, the program will be rapidly accelerated each year, and that Akron will be a city of dust-free, if not paved, streets.

The program has had another favorable effect upon property owners. It has made them aware of the desirability of living on an improved street. As a result, many of them have signified their intention of petitioning for pavement once the five-year period has expired.

● NO. 6 SLAG is spread at the rate of 26 pounds per square yard following each application of the emulsion.



● AFTER being broomed in, the slag is embedded with a 8-10 ton Galion roller. Asphalt emulsion fog coat follows.

Modernization of REFUSE DISPOSAL PLANTS

HENRY R. PATTERSON
Assistant Director
Department of Public Service
Columbus, Ohio

● **ASH DISPOSAL** arrangements being inspected by group of city officials, including Mayor Sensenbrenner (third from left) and the author, who is at the extreme right.

PROBELMS of accelerated population increase and increasing amounts per capita of rubbish and garbage collected and disposed of have faced Columbus, O., since 1934 when the Short Street incinerator was built. The capacity of that incinerator was 150 tons per day. In 1935, the McKinley Avenue or West Side Incinerator was built for operation by WPA labor. This had a capacity of about 50 tons per day. The population of Columbus was about 300,000. Most garbage was hauled in open trucks, with or without canvas flap covers. After WPA days, labor did not want to handle garbage with rakes and hoes; labor costs went up; the McKinley Avenue Incinerator was shut down because of high operation costs. In 1949 another furnace was added to the downtown Short Street Plant, raising its capacity to 300 tons per day.

By 1950 population had reached 375,901, and by 1954 had passed 425,000. A fleet of 30 modern enclosed packer trucks collected a total of 50,478 tons of garbage and 40 modern packer type rubbish trucks collected 354,746 cubic yards (about 53,000 tons) of refuse while traveling 723,213 miles. Garbage was collected weekly, refuse every 5 to 6 weeks. Garbage collection increased greatly with the addition of more combustibles such as newspapers and frozen and prepared food cellophane and wax paper wrappings. Refuse or incombustibles like ashes were less with decreased domestic use of coal. Incinerators were greatly needed with increased collections of burnables that were not suitable for dumps. Serious problems of operation were created, such as fly ash, odors, clinkering and burning of walls in the furnaces.

Columbus had two old furnaces, one modern furnace and a badly overloaded plant during the summer months. It was necessary to run seven 24-hour days a week to keep ahead of the load. A furnace breakdown was a catastrophe. All agreed that more plants were needed, but they must be built in the other fellow's neighborhood. An investigation of the reinforced concrete incinerator building at McKinley Avenue and Fisher Road showed it in excellent condition. Location was away from residential areas; the site had possibilities for making the plant attractive by landscaping; and new machinery was available to eliminate nuisance from fly ash and objectionable odors and to operate by push-buttons rather than back-breaking hoes and rakes. The existing smoke stack was 78 ins. diameter by 103 ft. high. A furnace capacity of 141 tons per day was determined by the stack size.

By 1955 increased use of home garbage disposals showed a definite trend. Underground sewer pipes transported ground garbage from homes to the sewage disposal plant where valuable gas was reclaimed and used to help run the plant. Therefore, plans were formulated for a garbage grinding plant having a capacity of 10 tons per hour. This plant will be adjacent to the Central Short Street Incinerator and will be fed by the incinerator crane.

By this autumn, Columbus will nearly double rated facilities from 300 tons per day to 541 tons per day as follows: Central, Short Street Incinerator, 300 tons; Central, Short Street Garbage Grinder, 100 tons; and West, McKinley Avenue Incinerator, 141 tons.

This expansion was financed by a bond issue of $140,000 for remodeling and rehabilitating McKinley Avenue Incinerator and $12,000 from the general fund for a garbage grinding pilot plant.

McKinley Avenue Plant — This plant was put in operation in December, 1955. Public approval is assured, since the new plant will minimize the burning at an adjacent, open dump. Its location between the west and north sections is four miles from the heart of Columbus. It will serve a rapidly expanding Hilltop industrial area and a popular residential University district. Long truck haul time through crowded downtown streets will be saved. Individual covered Dumpster containers up to 10 cubic yards capacity will be available for commercial and industrial use.

The main concrete building is 37 by 55 ft., with an elevated corrugated aluminum roof housing a 3-ton crane. The charging floor is 8 ft. below the tipping platform. Furnace and ash removal floors are below. Boiler and control rooms, storage,

ADDS NEEDED CAPACITY

locker and office rooms equipped with toilets and showers are in the stair tower. An additional storage pit 18 ft. deep was constructed. Total storage capacity of floor and pit is 570 cubic yards or 115 tons. The Whiting Electric crane is underslung with enclosed air conditioned, electric heated cab. It has a 1½-cubic yard Blaw-Knox bucket. A Fairbanks-Morse scale has beams for 20,000 lbs. net and 30,000 lbs. total loads.

The Incinerators—The roof of the original Morse-Boulger furnace was raised to give increased furnace volume and capacity; 8-inch plastic refractory walls were constructed having a 3-in. air space and 1-in. block insulation against a steel casing. The furnace volume is 1,440 cubic feet and the combustion chamber 1,760 cubic feet. Chambers are separated by bridge and curtain walls. Grate area is 177 sq. ft. on Flynn & Emrich stokers. Above the furnace are three 6 x 8-ft. hoppers over two 33 x 33-in. and one 48 x 48-in. charging gates. All gates are hydraulic operated manufactured by Beaumont-Birch Company. Burning grates are divided into three sections, each with separate ash pit and air supply. Burning refuse beds are kept porous by uniform agitation of stoker bars which advance the material down a 15° incline. Burned residue, ashes, cans and other noncombustibles are deposited on dumping grates. Every few hours the grates are dumped into ash pits, sprayed with water and conveyed by Fairfield scraper conveyors to a 10-cubic yard closed receptacle. Ash pits are lined with hard burned paving brick. A 15,000 CFM fan furnishes air for grates and secondary combustion openings back of bridge wall. One Johnson oil burner with a capacity of 45 gallons of #2 oil per hour is used for starting fires or in emergencies to boost furnace temperatures to 1600° when garbage is very wet. Temperatures between 1600° and 1800° F must be maintained to insure odor-free burning and to protect the refractory.

Instruments make possible exact operation of the furnace. Temperature and draft indicators show combustion and fuel bed conditions at all times. Dust, smoke and fly ash are controlled by the addition of secondary air for combustion and by furnace design. Hot gases travel an S path over the bridge wall, under a curtain wall at triple velocity into a 17-ft. long settling chamber. A castable refractory damper at the end opens into the breeching and stack. All motor controls and indicating instruments are grouped on the stoking floor.

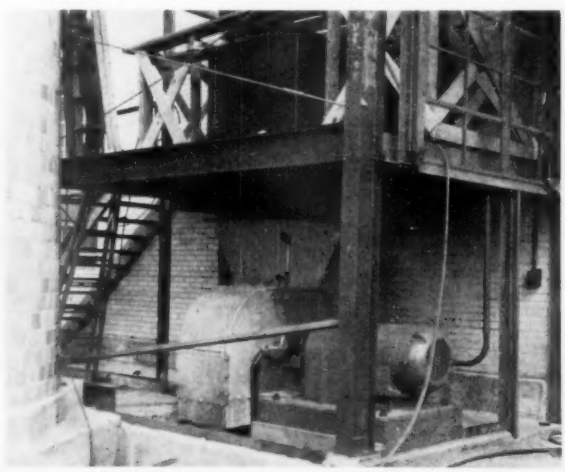
About 10 lbs. of air are required to burn each pound of refuse. Particular attention was paid to draw this air from an opening over the tipping truck doors and conduct it down the stair-well to the stoker fan. Thus foul air from garbage and refuse is used for combustion and the temperatures destroy all odors.

Garbage Grinding — For many years the Short Street Incinerator was beset with problems of heavy loads, wet garbage and a 1000-ton annual coal bill. One crane was required to mix wet garbage with paper or other combustibles. Operation was slowed, coal burning created excessive furnace temperatures and damaged furnace linings.

Garbage grinding offered odorless disposal, increased production, low first cost and upkeep and water transport to the treatment plant. Savings were shown by eliminating crane and burning labor and coal, and by reclaiming 2100 cubic feet of valuable gas per ton of garbage.

The plant was laid out in a two-story 10 x 15-ft. addition on the Short Street Incinerator. A 5-ton hopper was mounted at one end of the crane runway. A 36-in. Columbus Conveyor apron feeder will deliver the garbage to a water spray hopper over a Jeffrey 10-ton per hour garbage grinder with 50 hp motor. Tin cans, metal objects and other foreign materials will be picked off the conveyor or collected in a metal trap under the grinder. Ground garbage will be washed into a sump under the floor grating and discharged thence by sewer to the Sewage Treatment Plant nearly 2 miles south. A capacity of 100 tons per day for this unit with operation 10 hours a day is contemplated.

● **ROOF was raised 8 ft. to install underslung crane.**



● **GROUND garbage produces 2100 cu. ft. of gas per ton.**

LEAK DETECTION PROGRAM SAVES 390 MGD

THANKS TO A comprehensive leak-detection program, Chicago has reduced water waste by about 390 mgd in the past 24 years. A unique dye test that locates leaks in areas where conventional detection methods are ineffective deserves much of the credit. The success of the program is indicated by the following statistics:

Between 1932, when the present program began, and 1954, Chicago's population rose from 3,382,040 to 3,725,000. The city's industrial plant also grew; by 1954, 3,700 more industrial plants were operating within the city than in 1939. Total water consumption by industrial and commercial users rose from 152 mgd in 1932 to 304 mgd in 1953.

Yet, despite these increases, average daily pumpage in 1954 was only 7.3 mgd above the 1932 level of 1009.5 mgd. Water consumption per capita (domestic plus industrial-commercial pumpage, divided by population) has decreased sharply. In 1930, it was at a peak of 300 gpcd; in 1954, it amounted to 247.4 gpcd.

There has been a decline of approximately 200 mgd in the amount of unmetered water pumped between 1932 and 1954. Other factors besides the leak detection program have been responsible for this improvement. Among them are construction of public housing with metered services in areas that had been receiving unmetered supplies; and a stepped-up plumbing inspection program. However, officials believe that the leak detection program has been the most important factor in bringing about the decrease in unmetered pumpage.

Leak detection is the responsibility of a 70-man corps of specially-trained technicians in the Water Distribution Division. This group is divided into about 10 engineering parties, each of which consists of an engineer, a plumber, and four or more laborers. The engineer's job is to pinpoint location of the leak and direct the other personnel in preparing each pipe section for leak analysis. Repair work is handled by another division of the water department.

Leaks are initially located through district surveys. Since 1932, when the present program began, the entire city has been surveyed once; crews are now in the midst of the second survey, looking for leaks that have started since they were around the first time. Briefly, here is how the survey is conducted:

Each district covers an area of about 160 acres. All valves along the boundary of the district, except one or two, are closed; then a pitot tube and Simplex water measuring device are installed on the supply pipes feeding the district. A continuous flow record is made, on the average, for a two-day period. From this record, the engineer learns whether water is being wasted. Basically, he studies night flow and compares it to day flow, and checks both figures against analyses of the district that may have been made by the water department in previous years. If the night flow is excessive, leakage is present within the district. Once the presence of leakage has been established, the field party takes flow readings at several points within the survey district to get a better idea of where the loss occurs. The aquaphone is often used to pin-point the location of the leak.

Even though normal water flow isn't stopped, the noise of a big leak can usually be detected with this technique. The sounding rod of the aquaphone is applied at all points where the main is accessible from the surface. The gate valves at quarter-mile intervals are one type of listening post; others are service control valves, which are spaced as little as 25 ft. apart, and fire hydrants, 300 ft. apart.

Usually, this second phase of the survey narrows the area of the search down to a section of pipe about a quarter of a mile long. The gate valves at either end, as well as all service connections, are then closed. With normal water flow cut off, one of two things happen:

1. The leak disappears. In this case, the engineer knows the loss is in the service pipe on the user side of the service controlling valve. This must be repaired by the property owner.

2. The leak continues. By having the gate valves closed and re-applying his aquaphone, the engineer is often able to get a better idea of the location. During this second aquaphone test, a bypass hose and a 1-in. or 2-in. meter are connected around one of the gate valves. If the leakage is too large to be measured through the bypass connection

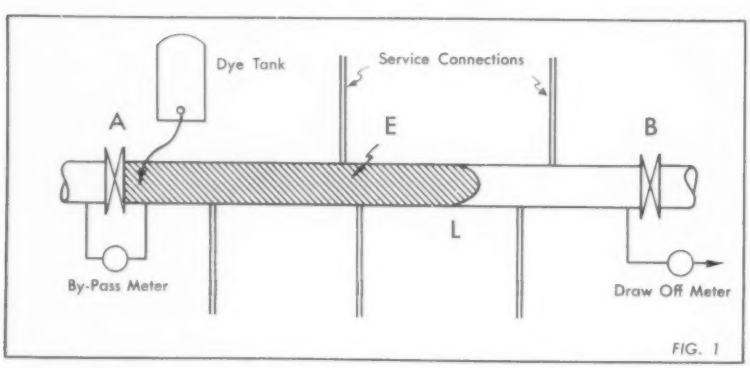


FIG. 1

● **DIAGRAM, Fig. 1, shows arrangement of meters at valves A and B, and passage of dye from tank to leak at point L. Alternate location for dye injection is at E.**

with a 2-in. meter, the connection is removed, one valve is opened, and a velocity measuring instrument is installed.

Normally, even after the aquaphone test, the leak still isn't located exactly. In outlying areas of the city, where there are a minimum number of utility conduits, one or more holes may be drilled through the pavement in the area above the main so that additional soundings can be made to pinpoint the spot more accurately. This technique isn't used in heavily-populated areas, though, since the drilling operation might easily puncture underground utility conduits buried near the main.

In these latter areas, the dye test is used to pinpoint the location of the leakage. The dye is also used under certain other conditions. For example, when water is discharging from a main into an underground pool formed by previous leakage, there is usually little or no sound. The same thing happens, sometimes, when a leak has gone undetected for some time, and the escaping water has worn the edge of the hole smooth.

● **WATER is fed through bypass connection and measuring device in leakage test.**

Also, some of Chicago's mains are buried more than 5 ft. below the surface. At this depth, it is usually difficult to sink the aquaphone rod accurately enough to hit the main.

Here is how the dye test works: After a section of the main has been isolated and the leakage has been measured through the bypass connection, a harmless vegetable dye (fuchsin), which colors water red, is injected into the pipe. The dye flows out of a 15-gal. pressure storage tank under about 100 psi. pressure so that it can be forced into the main. The rate, in fpm., at which the colored water in the main is moving can be determined if the cross-section of the main and the volume of water entering it through the bypass are known.

Referring to Fig. 1, assume a section of 8-in. main (A-B) 600 ft. long has gate valves at A and B. The leakage in this main is measured by the bypass water with all the service pipes shut off either at the curb cock or meter. Assume that the leak is at L, a point 400 ft. from A, and that it amounts to 30,000 gpd, the equivalent of 2.8 cfm.

The area of an 8-in. pipe being 0.35 sq. ft., the average velocity of water in this pipe is computed at 8 fpm. When the valve on the tank is opened, the dye colors the water that passes through the master meter. The water in the pipe between the point of injection at A and the point of the leak L will be colored, while the water from L to B will remain clear. The dye is fed into the pipe at A over a period of time sufficient for it to reach the other end of the pipe B. In this case, the time required would be 75 minutes.

After 75 minutes, the water in the pipe is drawn off. The amount of clear water that comes out is measured by the meter at B. The clear water volume is converted into lineal ft. of water in the pipe, which represents the distance in feet back from B to the leak. Theoretically, in this case, 70 cu. ft. of clear water would be drawn off, which would represent 200 lineal ft. of pipe. Actually, however, the figure would be 60 ft. because of the ratio between average and center velocities, which is usually about 0.85. Therefore, the actual quantity of water drawn off is divided by 0.85 and the resulting figure, converted into lineal feet of pipe, gives the actual distance from B to the leak.

● **STORAGE tank forces red dye under 100 psi. pressure into the water main.**

The dye does not necessarily have to be injected at the gate valve. For example, it could be added at point E in Fig. 1 and fed towards B. Under these conditions, only the service pipes to the right of E, together with gate valve B, would have to be closed. The waiting period would be reduced, and the leak at L could be found sooner. Another method of speeding the test is to take samples at valve taps ahead of point B. This requires calculating the amount of time the dye needs to reach each point, measuring the amount of clear water that comes out, and then proceeding as above.

It is sometimes advisable to check the accuracy of the test by making a second investigation with the dye flowing in the reverse direction. If this second test does not check the first result, the presence of two or more leaks is indicated. Should there be two leaks, then the dye test in the reverse direction will locate the second one. If the pipe contains more than two leaks, those located nearest the extremities of the pipe section are found first and stopped. Then the test is repeated and the other leaks are located in a similar manner.

● EXTENSION boom being used to spray weeds for a distance of 30 feet or more.

HIGHWAY WEED AND BRUSH CONTROL

HOMER JACOBS

Technical Service Director,

Davey Tree Company

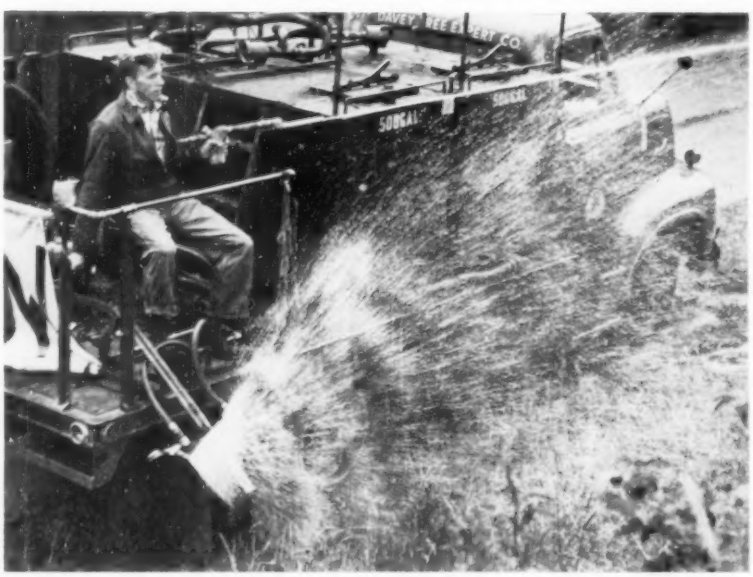
CHEMICAL WEED and brush control for highway problems divides itself into two or three parts, so far as planning is concerned. One has to do with the highway where weeds are the main problem; the second is where woody plants or brush make up the main problem; while the third is a combination of a weed and brush control problem. Most weed and brush control work, of necessity, is carried out during the so-called growing season since the chemical applications are primarily foliage treatments. This means that this work must be planned in most latitudes from about the first of May through September.

Most weeds can be controlled with formulations of 2, 4-D and these are the most commonly used materials. Woody plants are killed most effectively with formulations of 2, 4, 5-T. For a combined weed and brush control program, a half and half mixture of the two materials is usually used. These products are found on the market in formulated concentrates which usually contain 4 lbs. of acid per gallon of concentrate; that is, a 2, 4-D formulation usually contains 4 lbs. of 2, 4-Dichlorophenoxyacetic acid equivalent; 2, 4, 5-T formulations contain 4 lbs. of 2, 4, 5-Trichlorophenoxyacetic acid equivalent; the mixture usually contains 2 lbs. of each, or they may, for public use, be purchased separately and mixed in whatever proportions are desired.

From the chemist's standpoint, they are usually prepared in two general types—the amine formulations and the esters. While the esters have perhaps been more commonly used, there is ample evidence to show that the amine formulations are equally effective and they are decidedly safer to use, since they are not volatile and are less liable to cause damage off the right of way.

For control of most herbaceous weedy growth, 2, 4-D is used at the rate of 2 to 3 qts. of the concentrate with 100 gals. of water. For brush, the 2, 4, 5-T is used at the rate of 3 or 4 qts. of the concentrate with 100 gals. of water. For weed and brush growth, it is best to use a gallon of the half and half mixture. Most programs where weeds are the main problem are based on three relatively light applications per year. This is advisable to take care of the spring sprouting annuals and the biennials and perennials which germinate in late summer or early fall, while each of the applications gains somewhat on the established perennial growth. Where brush is the main problem, one annual application, until it is brought under the desired control, is sufficient.

In some programs made up of



● BROAD distribution of spray is accomplished by this type of sprayer. Note the coarse droplets which are important in preventing the drifting of the weed spray.

three sprays, the midsummer application contains 2, 4, 5-T and is applied somewhat heavier to take care of the woody plants. The amount of material applied to woody plant growth varies greatly, depending on the height and density of the growth, the frequency of spraying, the amount of money available per unit of roadside, and the degree of control desired. For light scattered brush, as little as 100 to 125 gals. of the diluted mixture per acre is sometimes applied. For dense tall growth, as much as 300 gals. or more per acre may be necessary to secure thorough coverage. While light applications will kill back the growth and tend to keep it under control, the idea is usually to eradicate or kill out the roots completely and, of course, up to a certain point, the more thorough the application, the better the kill.

Neither 2, 4-D nor 2, 4, 5-T in the concentrations or amounts usually applied are very injurious to grasses. Consequently, a highway right of way put under chemical treatment gradually gives way to the grasses as the broad-leaved species are killed out. As the more desirable grassy cover takes over, the cost of roadside maintenance is decreased. In Ohio, for example, a three-year program has been completed in a number of sections of the state. After three years of the three sprays per year, it is now recommended that only one application per year be made.

Mowing and Spraying Costs

Of greater interest are the figures showing the decreased cost of the combined spray and mowing, compared with the previous mowing costs. In 1953, unsprayed roadside costs were $92.75/mile to mow, while in 1955, even with increased wages, the combined cost of mowing and spraying was $89.91/mile. When these roads go on a one spray per year basis, the cost reduction, of course, will be even greater.

The general foliage applications, of course, are made with power hydraulic sprayers. The type of sprayer which has generally been used is similar to the piston type pumps used in orchard and shade tree spraying, although any dependable pump making 30 to 40 gpm. with sufficient pressure may be used. For weed spraying, 50 to 60 lbs. psi at the pump is sufficient. For brush spraying, through conventional guns and where some hose dragging may be necessary, the pump should perform at 150 to 200 lbs. psi. For weed applications, the liquid is spread through low pressure spray nozzles, either direct from the side of the truck with off-center jet nozzles, or with the aid of a boom of practical length, with flat spray or cone-shaped spray nozzles spaced along the boom. In some cases, an off-center nozzle at the truck and another at the end of a boom is sufficient.

The greater the length of the boom, the slower the speed of application must be. It goes without saying that any boom must be maneuverable to avoid sign posts, mail boxes and other roadside obstructions; with some arrangements of booms and nozzles, it is practicable to reach out for a distance of 30 ft. or even more in flat, wide right of ways. Where woody growth is low and close to the roadside, the off-center jet nozzles may be used for part of the application. However, for high banks of greater distances, the higher volume, higher pressure shade tree type spray guns should be used for brush spraying. These may be hand-held or swivel-mounted to take care of roadside profiles of varying elevations. These guns are rapidly adjustable from wide fog to solid stream and, depending on wind conditions and speed of the truck, can reach out with a solid stream 30 ft. or more.

Any truck should be equipped with whatever length of hose may be necessary to reach the edge of the right of way. Some trucks and sprayers have been rigged to allow the driver to manipulate the nozzles and guns, as well as drive. However, for safety on modern roads, as well as efficiency of application, the nozzle and the gun set-up should be under the control of an operator who doesn't have to drive with one hand, spray with the other, and try to watch traffic and the roadside vegetation at the same time.

● **ONE county sprayed; the other did not. Portage County on the right-hand side of the picture sprayed while Stark County roadside in background was not sprayed.**

After two or three applications, it may be found that some species of woody plants resistant to foliage applications remain. These will be scattered and usually represent relatively few stems per acre. When this situation is found, it may be economical to clean them up if desired, not by repeated cutting, but by basal rather than foliage applications; or by cutting the stems and spraying the stumps. For either basal or stump spraying, a solution of 4 gals. of 2, 4, 5-T concentrate with 96 gals. of No. 2 fuel oil or diesel oil should be used. This can be applied by regular maintenance crews, using knapsack sprayers. The kill is accomplished by thoroughly saturating the stumps or the lower 18 inches of the standing stems, with this mixture. The solution should be applied all the way around the stem and to the point of run-off down to the ground line and into the ground. This application may be done at any time of the year, al-

though it should not be used when there is much snow on the ground, nor can it be depended on if the applications are made to stems standing in water.

Tank Sizes

The tank capacity for foliage spray programs can be of any reasonable size, although tank capacity of at least 1000 gals. is usually specified for extensive roadside campaigns. The customary shade tree or orchard sprayer is made in a three-in-line assembly, consisting of motor, pump and tank, in order to make the easiest assembly for mechanical agitation with the tank. This assembly does not always make the most efficient use of the bed space or carrying capacity of the truck. Consequently, the pump, motor and tank need not be a rigid connected assembly. Tanks can be made or purchased that occupy the full width of the bed back of the cab, leaving plenty of space for the pump and motor and for carrying supplies. There should, however, be some agitation provided and this can be accomplished with jet agitation from the by-pass outlets of the pump.

Some consideration should be given to the possibility of adverse public reaction to extensive weed and brush control programs. Perhaps the best way to do this would be to keep the public informed through whatever medium possible, of the benefits to be obtained from both the standpoint of lower cost and the eventual more desirable grassy cover. Applications should always be made by specialists experienced and skilled in the problems involved. This sort of skill is available through reliable chemical weed and brush control contractors.

At any rate, there must be built up in whoever does the work, an awareness of the dangers, as well as the benefits, from such programs. The materials used are potentially dangerous to vegetation off the right of way, as well as on the right of way. Like the rifle in the hands of the hunter, the spray gun should never be pointed at anything that you don't want to kill. The so-called hormone materials, 2,4-D and 2,4,5-T, in extremely small amounts, may warp or distort certain sensitive ornamental or crop plants. Even a few small particles drifting onto such sensitive plants as cotton and tomatoes may cause damage. This sort of damage may also be caused by the volatilization of the ester types of material. This is the reason why the amine formulations are especially recommended for roadside work. Low pressures to prevent extremely fine break-up and other precautions can be taken to minimize the danger. In some locations, chemical weed and brush control should not be attempted with the hormones for this reason.

Ammonium sulfamate, found commercially under the trade name of Ammate X, is a somewhat more expensive material and may cause temporary browning of grasses but is a safer material to use in locations where the hormones should not be used. It may be undesirable to use chemicals in scenic areas or on steep banks where killing out of the heavier tree roots might result in erosion which the grasses could not control. In some locations it may be desirable to cut the stems, and spray the stumps, in order to lessen the temporary browning of the foliage.

None of the materials discussed in this article is poisonous to cattle or to wild life—in fact these materials are commonly used by farmers in their own weed and brush control activities.

● **SPRAYING with the adjustable hand-held guns enables the operator to direct the flow of chemicals to solve the roadside weed and brush problem in rural Ohio.**

● **WEEDS can be eliminated entirely by a regular rural highway spraying program.**

How Design of a SEWAGE TREATMENT PLANT *Reduced* EXPANSION PROBLEMS

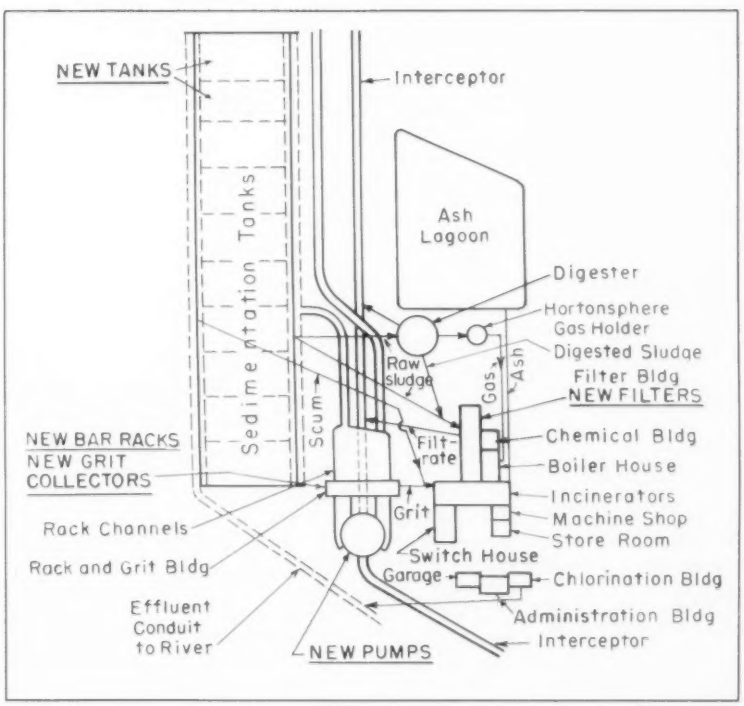
WHEN THE DETROIT sewage-treatment plant went into operation 16 years ago, it incorporated certain ideas that attracted little attention at that time. But now in 1956, the farsightedness of the engineers who designed the plant has permitted its expansion with a minimum of cost, fuss and fretting. The engineers designed into the plant the means to expand it easily and at least expense.

The plant, opened in 1940, was designed with excess capacity enough to handle an expected population of 2,400,000 by 1950. Ideas also were incorporated into the design to permit ready expansion to accommodate a 4-million population. At that time the sewage load was 400 mgd but now it is 500 mgd.

Expansion provisions were made at various points in the plant layout. The original pumping station, to which sewage first goes from the interceptors, had six vertical sewage pumps with a total capacity of 890 mgd. Two new pumps, now being installed, will add 300 mgd more capacity. The original design provided space to be left available for the new pumps.

Likewise, extra space was provided at the next sewage processing point—in the rack-and-grit building—for the two new bar racks and the two pairs of new grit collectors now going into place alongside the six older bar racks and the six pairs of older grit collectors. The bar racks are mechanically cleaned units with ¾-in. openings between parallel bars. Grit settles out in the grit channels which are 150 ft. long. Each pump has its own rack-and-grit chamber.

Sewage next goes to the sedimentation tanks, which also are being expanded. To the original eight tanks are being added two new ones of the same design but shallower. These tanks are unusual in that they are covered. Rectangular in shape, each contains seven channels 16 ft. wide and 272 ft. long. The design engineers provided space for these two new tanks plus two more tanks to be added some time in the future. The installation work now underway is designed to make the addition of the final two tanks easier when they are needed.



● **LAYOUT of Detroit sewage treatment plant shows flow of sewage, sludge, filtrate and other materials within plant. Areas of plant expansion are indicated.**

About 20 percent of the sludge from the sedimentation tanks goes to a heated digester from which gas is piped to a 24,500-cu. ft. Hortonsphere gas holder. The gas then goes to the boiler house for use as fuel. The sludge treated in the digester, along with the 80 percent of undigested sludge, is pumped to the filter house. Eight Conkey rotary-drum vacuum sludge filters of 500-sq. ft. filter area each were originally installed, and space was provided for four additional units. Four new Conkey filters were installed in this space late last year. Even the pipe lines were arranged in the original layout so they could be extended readily to tie in the new filters. The new filters are of the same size as the older filters, 11½ ft. in diameter and 14 ft. long; thus they fit the floor space allotted to them in the original layout.

The new filters have one distinctive feature not available in the older ones—a water spray to clean the filter cloth in the dead, or no-vacuum, area without interruption of drum rotation. As a rule, the filters operate 24 hrs. a day, 7 days a week, with time out only to change filter cloths and for routine maintenance. Cloths on the older units are changed about every 350 hrs., but this time may be lengthened for the new filters with their continuous washing feature and polystyrene backing grids. On the older filters, it is sometimes necessary to wash filter cloths once each shift, which requires about 30 minutes down-

(Continued on page 210)

C. LELAND WOOD,

City Manager,

Watertown, New York

● CITY Engineering Dept. prepared the Paddock parking project plans. It also supervised the clearing and grading, installation of the storm drains and pavement.

STEPS IN SOLVING a

EACH YEAR THE increasing number of automobiles using city streets has emphasized the enormous problem of controlling traffic and providing adequate parking. The City of Watertown, like most other municipalities, has sought for a solution of this problem. Demands by the public, especially merchants and shoppers, had to be considered.

The first plan to ease the shopping-parking situation was to install parking meters in downtown streets to control parking. Watertown, in 1936, was one of the first cities in New York state to adopt such a plan. For several months regulation of parking by meters drew protests from many who had previously driven to the Public Square in late afternoon or early in the evening and parked to watch the passing traffic. Merchants, clerks and professional people accustomed to the use of unlimited street parking complained at the change. Soon, however, it became apparent to most everyone that what seemed to be a drastic regulation and a new-fangled idea, was the proper procedure. The public demanded an extension of the meter zones in business streets, appreciating the benefits derived therefrom.

In heeding the numerous requests for, and the necessity of providing, more parking facilities partly to offset the extension of the "No parking at any time" zones, plans for municipal offstreet facilities were developed. Though many privately operated offstreet parking lots were started, these failed to furnish enough space to satisfy the ever-increasing demands.

City Hall Parking Lot

In the rear of the City Hall a small off-street parking area was provided upwards of 35 years ago. In 1938, an adjoining property which was once a graveyard in the rear of a church was added. Remains of bodies were removed to another cemetery and the area graded and paved. A few of the separated bones are buried in a small island in the center of the plot.

In 1950, a large parcel of land adjoining the City Hall parking lot, owned by the New York Central Railroad Company, was leased. This additional area was graded and a gravel base placed and double surface treated with asphalt and fine stone. Railroad rail bumper guards are installed around the perimeter of the lot. A connection with Jackson Street provides a second means of ingress and egress. The municipal street lighting system was extended to serve the area. There are 214 parking spaces available, all controlled by meters, except those assigned for use by employees in the City offices and the Police Department.

Meters are attached to short posts welded on the top of the steel bumper rails around the perimeter; each serves one stall. In other portions of the lot, parking islands were constructed to serve meters and control traffic. A few meters nearest the City Hall are adjusted for a 36-minute time limit to serve people on short errands. Beyond the short time units are 60-minute meters for those who desire longer time parking. The balance of the space is controlled by 5-hour meters for those who wish to stay for a longer period.

The 36-minute meters allow 12 minutes for each penny; the 60-minute units operate with pennies or nickels while the 5-hour ones accommodate a 5-cent piece per hour, or 25 cents for the limit. Meter parking time extends from 9:00 am to 8:00 pm.

Most of the parking spaces next to the islands are served by two meters on one post located between each two stalls. Where parking is available on both sides of an island four meters are attached to one post by a specially designed yoke fixture.

The cost of the original development is unknown; however the expense of extending the facility in 1950 amounted to $24,780.85. The 165 meters were purchased on a 50 percent revenue basis and installed at a cost of $11,550, which is included in the above figure. The meter account was balanced on a negotiated price basis prior to the end of the purchasing agreement term. The 1955 expenses totalled $5,700 and the meter receipts amounted to $6,062.25.

● PARKING islands were built to serve the meters and control traffic flow.

● PAVEMENT consists of a 10-inch gravel base with a double asphalt penetrated surface. Wood bumper rails were installed around the perimeter of the paved area.

CITY'S PARKING PROBLEM

Paddock Parking Lot

Continued pleas from the Chamber of Commerce and the public for more off-street parking facilities induced the City Council to ask for permission to use land which had been willed to the Jefferson County Historical Society for use as a public park. For many years the City maintained the Park portion of the property, although little use was made of the facility by the public.

The Historical Society was anxious to augment its funds from rents; therefore it proceeded to obtain a ruling from the Supreme Court to vary the land use indicated in the will so that it could be leased to the City for parking. To obtain suitable access to this land, it was necessary for the city to condemn a residential property. Some delay occurred, until the defendant property owner agreed to permit the City to cross the lot prior to decision on the price and title transfer.

The City Engineering Department prepared the parking project plans and when the contract was awarded it supervised the work which consisted of removing trees, grading the area on a slope of 1 percent toward one end, installing storm drains in the lowest part and placing a 10-inch gravel base with a double asphalt penetrated surface. A parking island was provided lengthwise along the center of the lot. Wood bumper rails were installed around the perimeter of the paved area 10 feet from the fences to avoid cutting trees and to permit a park strip for public use. The bumpers are 4 x 6-in. creosoted timbers attached to treated posts set 3 feet into the ground. A chain link fence with a small gate separates the parking area from the front portion of the property used by the Historical Society.

On the access lot a multi-family residence and garages were located. These were demolished by contract. The City Public Works Department filled the cellar; installed a storm sewer; graded the plot; placed the gravel base; double penetrated the surface; erected bumper rails along either side line; constructed a concrete entrance and exit ramp and street sidewalk; and painted all of the 212 parking stalls and the directional signs. The City street lighting distribution system was extended to illuminate the whole area. A six-foot chainlink fence encloses most of the lot.

Parking Control

Two methods of parking control were considered and it was determined to employ attendants on a trial basis in preference to using parking meters. Experience indicated that there might be a loss through vandalism and greater difficulty in snow removal in winter if parking meters were installed.

The schedule of charges permits weekly parking for $1.50. The daily parking charge is 10 cents for the first two hours or fraction thereof and 5 cents per hour thereafter to a total of 35 cents per day. No charge is made for parking at night.

One attendant works from 8:00 in the morning to 6:00 at night, 5 days each week. A substitute works each regular day lunch hour and all day Saturday. The wage rate is $1.50 per hour. Nobody is on duty holidays and Sundays, nor on Saturdays during the summer months.

The parking plan for the Paddock parking lot was developed so the original Park idea of the donor could be partially recognized. The ten-foot park strip around the perimeter of the area saved many trees and permitted landscaping which involved a small amount of grading and seeding back of the bumper rail. Benches are provided for public use and trash cans so located as to urge parkers to help keep the space clean.

The cost of providing this 212-space parking facility was $61,-238.94, of which $24,693.84 was for property purchase and $31,902.22 for area preparation and paving. The operating and maintenance cost per year is $16,559, which includes $4,822 for attendants; $700 for snow removal; $3,500 for rent; $4,000 for debt service; $743 for loss of taxes; and other miscellaneous items. Revenues amount to $10,487.40.

The rates charged for parking were made comparable to those of proprietors of private parking lots in order not to discourage private endeavor. The City operations, with the high capital investment, are not

● FOUR parking spaces are served by one post and four meters in the parking lot.

an attractive proposition financially for the first few years while the debt is being amortized, but are advantageous from the viewpoint of local business and public service.

There are 3,169 offstreet parking spaces available in the business district in Watertown which is about average for cities its size. As the demand for additional facilities of this nature becomes greater more space must be provided.

A study of costs of marking the stalls in the parking lots and streets, the painting of directional signs on pavement surfaces and the cost of applying painted center line striping produces interesting unit prices. Information from the Public Works Department, based on its experience, shows that the approximate cost for painting each parking stall is $1 where 50 or more stalls are involved.

Painting of directional signs such as arrows, "No Parking," "Right" or "Left turn," etc. costs about $3 per unit. Center line striping, 4 ins. in width, which sometimes requires a second application seems to be about 15 cents per lineal foot. These amounts include the labor and trucking time required in transportation to and from the site.

Snow Removal

On three sides of the City Hall parking lot there are steep slopes down from the bumper rail to a lower level. In winter, when it is necessary to remove snow, the street snow plow clears a passage through the aisles. One tractor shovel equipped with a snow bucket picks up the snow and on short trips back and forth across the lot, deposits its loads over the rail down the slope. Regardless of the intensity of the storm, there is ample room to store all of the snow which it is necessary to remove to facilitate parking. Obviously the cost of snow removal from this area is held at a minimum.

In winter, the park strip of the Paddock lot serves the purpose of providing convenient and ample storage for the snow which is removed to permit parking. A snow plowing unit clears the traffic lanes, then a tractor-shovel with a large snow bucket removes the snow and deposits it on the perimeter area. The entrance lot cannot be treated like the main lot. It is necessary to load snow onto trucks and transport it to the river. Such truck transportation of snow from parking lots is expensive, dependent on the length of haul, and ought to be avoided unless snow storage on a lot reduces its capacity below a satisfactory operating limit.

When automobiles are parked all night in the parking lot, snow removal operations are delayed and cannot be completed until the cars are moved.

Chemicals were used only once this past year when the area was covered with a thin film of ice and the slight grade prevented some drivers from moving their cars. The driving public has become so accustomed to summer driving conditions here during the winter that frequently they do not use the normal procedure in starting and driving a car on a slippery paved surface.

AIR CONDITIONING
Brings WATER PROBLEMS

Town of 6,500 Uses Metered Rates, Strict Controls To Avoid Critical Shortages During Summer Season

LESTER D. KEMPTON
Superintendent of Utilities,
Trenton, Missouri

THE RAPIDITY with which air conditioners are being installed in our city can be seen from the record of the last few years. In 1952 we had only three air conditioners requiring water to cool the condensers. In 1953, six more were added; in 1954 there were 16; in 1955 there were 24; and in the first 3 months of 1956, there were 8; making 57 installations. This rate of increase gives an indication of what can be expected in the next few years.

In the last few years, we have heard a lot about air conditioning and its probable effects on utilities, yet only a few cities and towns have taken any action. Some city officials are hesitant because they are not sure just how air conditioners are going to affect their own particular utility. Any city official who thinks non-conservative air conditioners are not going to affect his town or city is in for a sad surprise, because there are very few water plants with present capacities large enough to supply enough water for unlimited use of non-conservative air conditioners.

We here in Missouri are just beginning to feel a few of the effects of air conditioning At Trenton, we have had a slight taste of these effects. The amount of water used to cool air conditioner condensers varies considerably depending on the weather, type of building, water temperature, size of unit, and a number of other things. By metering the air conditioners before and after cooling equipment was installed, the monthly averages were found to be 3,500 cubic feet for three-ton units, 4,600 cubic-feet for five-ton units, and 6,300 cubic feet for ten-ton units.

The Potential Demand

These units are typical business house installations, covering an insurance office, an appliance store, a clothing store, two grocery stores, and a cafe. It is interesting to note that the smaller the unit the more water is required per ton of cooling capacity. This may be due to the tendency to overload the smaller units. By taking the average usage on the three sizes, we get a figure of a little over 800 cubic feet per month per ton cooling capacity.

To estimate the potential need for water to supply uncontrolled non-

conservative air conditioners, let us take an ordinary main street business block of nine or ten business houses. Their normal water consumption for drinking and sanitary purposes will run about 2,000 cubic feet per month for the whole block. Now let us add eight non-conservative air conditioners to this block, 2 each 3, 5, 7, and 10-ton units, making a total of 50 tons of cooling capacity. By multiplying this 50 tons of cooling capacity by our 800 cubic feet per ton, we find this business block requires 40,000 cubic feet for air conditioning, plus their normal demand of 2,000 cubic feet making a total of 42,000 cubic feet, or considerably over 300,000 gallons per month.

Some of you may wonder why I say 80 percent of our business houses will have air conditioning. This is not necessarily the businessman's idea, but is a demand of his customers. People will not eat, shop, or do business in a hot building any more, so in order to satisfy customers and meet competition, we find businessmen buying air conditioners for all kinds of businesses. Early in 1954, one of Trenton's smaller grocery stores put in a 7-ton air conditioner. Within two month's time two of the city's largest supermarkets had each put in two large units.

Residential areas are also coming into the air conditioning picture, but not nearly to the same extent as business areas. It is a conservative estimate to say that we can expect to have one or two homes out of every 10 with air conditioners large enough to require water for a coolant; in other words an average of about 15 percent.

By using these estimates of air conditioner use of 80 percent in business areas and 15 percent in residential areas, and using 6 tons as the average size of units, we find the air conditioning demand alone for the 2,000 residences and the 450 business houses that we have in a town of 6500, would be over 3 million cubic feet, or 22 million gallons per month.

In other words, if all our air conditioners were of the non-conservative type, our city of 6,500 would need a water plant capable of supplying over 3 million gallons per day, with storage facilities for another 1½ mg to absorb the daytime shock demand on the system. It is not necessary to discuss the economics of such plant expansions; it can readily be seen that they would be economically unsound.

Control Procedures

In Trenton we have enacted two ordinances, aimed at controlling and regulating non-conservative air conditioners. The first ordinance gives us the right to inspect new installations. Before final passage of the ordinance, a request was made to council to place a demand rate on water.

This demand rate was to affect all water used per month in excess of 20 percent above the average monthly usage, from October to April. When finally passed, however, it was an ordinance calling for separate metering of water used in non-conservative air conditioners, and setting a straight rate of 40 cents per hundred cubic feet which was, at the time, our top rate.

● **KEEPING water meters at top efficiency requires regular maintenance.**

This ordinance proved to be one of very much value. It was passed in August 1953, and became effective September 5, 1953. Our first experience with this ordinance came from a drug store that installed a 5-ton unit the latter part of August. Much to the owner's disgust our water department installed a new meter beside his regular meter, and issued him a permit to operate his air conditioner.

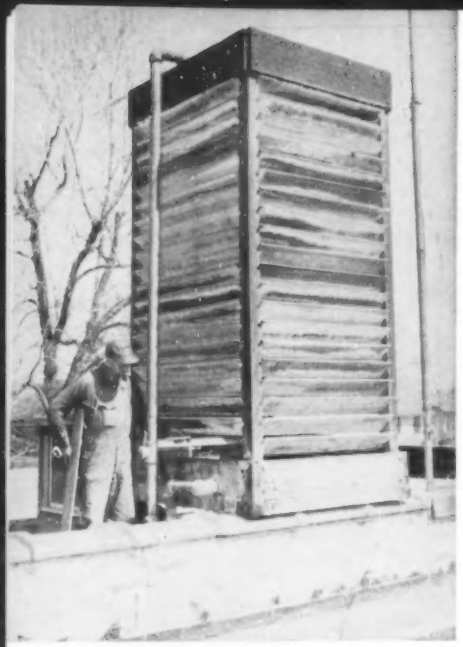
He operated his air conditioner the 19 days until the next regular meter reading day when he had the meter reader figure out the cost. This totalled about 65 cents per day for the fall days when the weather was not too hot. The druggist did us a favor by telling everyone that his air-conditioner running directly on city water would cost him over a dollar a day for water in the summer months. He had repeatedly said his landlord wouldn't allow him to put a cooling tower outside the building, and that he didn't have room inside for an evaporative cooler, but by the next spring he found plenty of room in his basement for an evaporative cooler.

The publicity given the water department by this drug store was a contributing factor in causing the installation of at least five cooling towers or evaporative coolers on other installations.

In April, 1954, the billing clerk went through the meter sheets and listed all customers whose meter readings for the summer and fall of 1953 indicated the possible use of water for air conditioning purposes.

This list was given to our most diplomatic service man, and he called on each one informing them of our two ordinances, and telling

● **AIR CONDITIONING unit in the cellar of a retail store in Trenton. Almost universal use of such equipment has greatly increased the water demand in many places.**



● **COOLING towers, with re-use of water, greatly reduces water demand.**

them that we wanted to give them plenty of time to get cooling equipment for their air conditioners before hot weather, and he did not want to have to install a special meter which would put most of their water on the high rate. This procedure added more cooling equipment. As of the end of 1955, 56 evaporative or other water conserving devices have been installed. This is due, in part to the fact that our dealers, either from being co-operative or from fear of dissatisfied customers, refused to sell air conditioners in Trenton unless cooling equipment was also installed.

Now and then someone will buy an air conditioner out of town and install it himself with the idea that the ordinance doesn't apply to him; but when the billing clerk comes to his next meter reading he throws it out for a reread and investigation, because if the meter has been read correctly, one of two things is true: The customer either had a bad water leak or an illegally installed air conditioner. If it is the latter, the customer is billed on our top rate for all water used, and is notified to come to the office and register his air conditioner and get a permit to operate it, or his water service will be discontinued. It is in situations of this kind that our special rates show their real value, and why I think that all control ordinances should include a demand rate based on fall and winter usage.

Our metered rate for water used in non-conservative air conditioners is 40 cents per hundred cubic feet making the cost of operation per month about $15 on 3-ton units, $19 on 5-ton units, and $35 on 10-ton units. While these rates do discourage the use of non-conservative air conditioners they are not quite high enough to prohibit their use completely. If I were to recommend a rate, I would say at least 60 cents per hundred cubic feet, but this should be a demand rate rather than a metered rate.

Another reason for my partiality to demand rates is that they act as an automatic policing system on all wasters of water. They make the owners of faulty cooling equipment, and all others who use water to excess pay for their carelessness. The time is here when our modern standard of living is forcing us to conserve water—the one natural resource that we have always taken for granted.

Among the contributing factors to our difficulties were refrigeration machines, which although equipped with evaporative coolers, required large quantities of water, either because of limed up or corroded cooling coils or too small a cooling unit to cope with excessive summer temperatures.

Demand Was Going Up

To give a better idea of our experiences during the summer, let us compare figures. Our 24-hour demands during the summer months in previous years have run in the neighborhood of one million gallons with peak hourly demands of 60 thousand gallons for three or four hours out of the twenty-four. In the summer of 1954, we encountered hourly demands of 84 thousand gallons lasting as much as eight hours out of the twenty-four. From this we learned the meaning of shock demand on our system.

After an experience of this kind it appears to me that we cannot make control ordinances that will completely solve our problems; and at best air conditioners are going to raise our water demands 25 percent to 50 percent depending on our ordinances and their enforcement.

The advent of air conditioning has, without doubt, created one of the most difficult problems ever encountered by water departments. To solve this problem satisfactorily we must first educate our citizens to the problem and to the necessity for control measures. We can do this by talking to our local service clubs, and with the local press. We need and must have adequate control ordinances. Here are a few of the points that I think should be incorporated in any adequate ordinance:

First: It must place complete control of the phases of the water works in the hands of the superintendent, including emergency powers.

Second: It must provide a system for inspections and the issuance of permits which are revokable at any time by the superintendent.

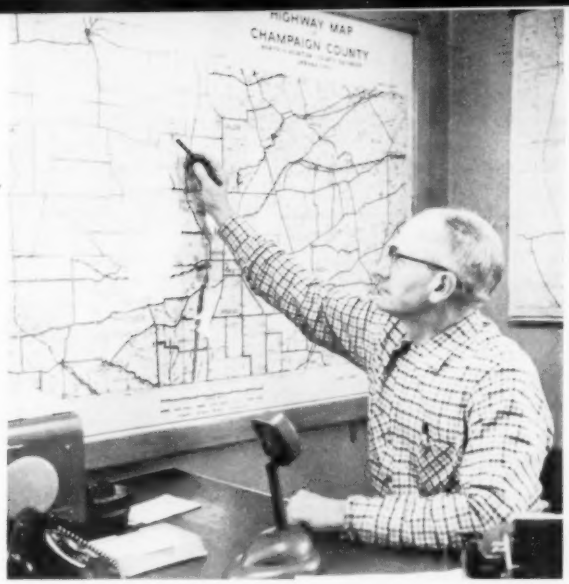
Third: It must provide safety measures as to sanitation, and electrical connections.

Fourth: It should provide a rough demand rate based on winter or yearly usage.

Fifth: It should provide penalties, and the power to discontinue water service in cases of violations of the ordinance.

● **LARGE meters are necessary on some air conditioning installations; the water bills can be large, too, with increases of 25 to 50 percent in resulting water use.**

● EQUIPMENT is painted white above and orange below.



● RADIO operator, Lewis Metherd, is sending message.

TWO-WAY RADIO *used in* Maintenance and Construction

NORTH H. NEWTON
Champaign County Engineer
Urbana, Ohio

RADIO IS THE best and cheapest maintenance and construction tool that we have in Champaign County. Fast and quick communication is just as essential to any highway department as it is to a military commander. Neither can be very efficient without the best in fast, quick communications. Two-way radio gives the highway department that essential communication. It is cheap; it is so cheap that you cannot afford to be without it.

After having used radio communication for nearly two years, we sometimes wonder how we got along before we used radio. Now all crews are in constant touch with each other and with our office at the county seat. Instead of waiting from an hour to four or five hours for some information from a job site to be obtained by a person going out to the site and returning, we now usually get this information in a matter of minutes. The entire department is much more productive in its work.

It is possible to improve public relations through better communications. This allows the department to give quicker service which generally means better public relations. This side of the highway department program is overlooked by too many engineers. Good public relations are also a very good thing to have at any time.

As an example of better service I will cite the following experience: One afternoon a lady from a village in the east part of the county came into our office to inquire about some drainage along one of our roads. She was not familiar with the details. Our drainage maps were not complete enough to help much. I was about to tell her that someone would come out in a day or so when I remembered that my deputy engineer was in the east part of the county not many miles away. I contacted him by radio. He went to the site, investigated the drainage situation and found a tile ditch that was not functioning properly. This caused water to lay in the roadside ditch close to our paved road.

As a result of this investigation a maintenance crew was sent out the next morning to repair the tile ditch. Ordinarily in the days before radio, the deputy would have returned to the office late in the afternoon when it would have been too late to have gone out again that day. He would have made his investigation the next day. Then the following day, which would have been the third day, the maintenance crew would have gone out to make repairs. At least a day was saved on this one job. This is not much to get excited about you might say. This is true, but multiply it by every working day of the year. A great many instances occur every week where time is saved.

The cost of radio equipment is not high. In fact it is so cheap that you cannot afford to be without it. We started out in July, 1954, with one base station and six mobile units. All of our radio equipment is made by Motorola. Our transmitters have a power output of 60 watts which made our equipment a little more expensive; but our investment in radio equipment was only $5956. Every highway department that has purchased a tractor, a bulldozer, or a motor grader in the past two years has paid from $12,000 to $16,000 for just one piece of equipment; and they probably think they have a wonderful piece of equipment. However, this construction equipment will assist in a limited number

of ways with the work program. Radio will assist you in every way many times a day with your work program. Again I say you cannot afford to be without radio. There is nothing that will give as great a return for the investment.

Our maintenance for the first year amounted to $184.83. This was especially small compared to the results that were accomplished by the use of radio.

Champaign County is a county of 432 square miles in the middle west part of Ohio. We have 240 miles of highways in our county system and about 360 miles in our township system. The county is rectangular—about 15 miles wide and 28 miles long. Urbana, the county seat, is very close to the center of the county. We are not a rich county. We must stretch our revenue as far as possible.

Eight Mobile Units

During the past year we have added two more mobile units. This makes a total of 8 units which are distributed as follows: One in my car, one for the survey crew, one for the road superintendent, one for the garage mechanics, and one each for 4 foremen. This allows all of our forces to be in communication with our headquarters at all times.

Radio communication is very useful all the time. It is quite hard to say that it is more useful at one time than at another time. It is very nice to have during snow plowing or during icy conditions. We have some snow storms that affect only a part of the county and you are never sure which part of the county is hit until someone checks it. If one section is hit worse than others, snow plows can be shifted to that section before they return to our garage. This saves considerable time, and allows all roads to be opened up sooner. The same thing happens during some ice storms. Crews can be shifted while still in the field.

We have a large map of the county in a frame hung on the wall near the microphone in our headquarters operations. This map is covered with a sheet of clear plastic. The road superintendent or any of his assistants can keep a visible record of each snow plow crew on this map. You can write on this plastic sheet over the map with a grease pencil. This allows a progressive record to be kept right on the map as each crew reports in by their radio. A close tab can be kept on all snow plow crews. When this record is not desired any longer, you can wipe all the marks off the plastic with a dry cloth. This map can be used for a great many purposes where only a temporary record is desired.

Any piece of equipment is subject to breakdown and this breakdown nearly always happens when you have some job under way. We have reduced the amount of down time through the use of radio. If equipment breaks down, the foreman can call the garage on his radio, and a mechanic will be on his way out in a matter of minutes after the breakdown. Sometimes the foreman can tell the mechanics what is wrong, and they can bring the proper repairs and tools. A great many minor repairs are made in the field with a minimum of down time. Sometimes the mechanics will receive a call from another work crew while they are in the field. The mechanics save some travel time by being able to receive calls all the time that they are away from the garage.

During the black-topping or paving season some time is saved by being able to divert stone trucks while in transit. The foreman cannot always estimate his stone requirements to the exact truck load, but he can call our office by his radio and ask for certain trucks to go to another road. A telephone call to the stone plant will divert the trucks to the next paving job, saving travel time for the stone trucks and speeding up the paving job. It also allows the foreman to keep closer tab on his operations.

Since starting to write this article we have had an unfortunate experience with a piece of heavy equipment at a gravel pit. A bulldozer weighing about 10 tons upset and pinned the operator under it. The operator was working by himself at that time. About a half hour after the accident occurred, our half-yard dragline arrived to work with the bulldozer. The dragline operator discovered the accident, ran to the nearest telephone about a half mile away, called our office and reported the accident. All available men and equipment at the garage were immediately dispatched to the scene of the accident and additional men and equipment were called to the scene by our radio including the ambulance operated by the Urbana Fire Department.

The dragline was able to lift the bulldozer enough to get the operator out and he was placed in the ambulance. The ambulance crew used their radio to ask the county sheriff for an escort through Urbana to the hospital. This was furnished; the streets were cleared. The hospital had been advised of the accident and were kept informed of all developments and progress by a relay by telephone from our radio and from the ambulance radio. The hospital was fully prepared and ready when the ambulance arrived. The outcome was that the operator was not seriously injured. No bones were broken though he suffered from shock and exposure for he had been in cold water for about an hour. He was released from the hospital after 3 days. We cannot say that radio saved his life. In fact, we cannot say that any single thing saved his life. It was everything working together that did it. Radio was one of these things.

(*Continued on page* 216)

● **FOREMAN Harold Faulkner, at pickup truck, and operator of Seaman Pulvi-Mixer, Laurence Downing, are checking by radio with garage about repairs.**

A COUNTY FINDS MANY USES FOR AERIAL PHOTOS

MELVIN B. LARSEN
Henry County Engineer
Mt. Pleasant, Iowa

EVERY ENGINEER reads of the ideal situation or methods to be used in his work, but we have to use the materials, data and funds at hand to the best possible solution of the problem. Ingenuity might be called the right hand of the engineer, and many times it has produced unbelieveable results and methods of getting things done.

We of Henry County, Iowa, had read and dreamed of the possible savings aerial photos might give us even in our rural area. The cost of having our county photographed was out of the question financially. Our local agricultural office offered the solution to our problem. We discovered they possessed sets of outdated aerial photos and with the assistance of the state director and local representatives, these photos were obtained for our use. They are not overlapped so stereoscopic viewing is not possible but that has not hindered their usefulness. If, for some reason, the very latest prints are needed, they are available for viewing at the agricultural office.

Henry County, located in southeast Iowa, comprises 12 civil townships. We maintain 720 miles of roads and about 500 bridges. Our county is split from the northwest to southeast by the Skunk River, with the southwest half hilly, wooded and rough and the northeast half very flat terrain of rich black soil. Our budget is approximately $225,000 per year for maintenance and $240,000 per year for construction. In addition Farm-To-Market funds provided by a combination of state and federal funds add $120,000 to our construction budget.

Our office now would not be complete without a set of aerial photos for checking or obtaining drainage areas for culverts and proposed bridge construction. The job of checking areas is very simple. We use white chalk, which wipes off readily, to outline the areas on the photos.

● **AN AIR MAP, such as this one, though outdated and made mostly for agricultural purposes, can be of much value, saving travel and hours of engineering time.**

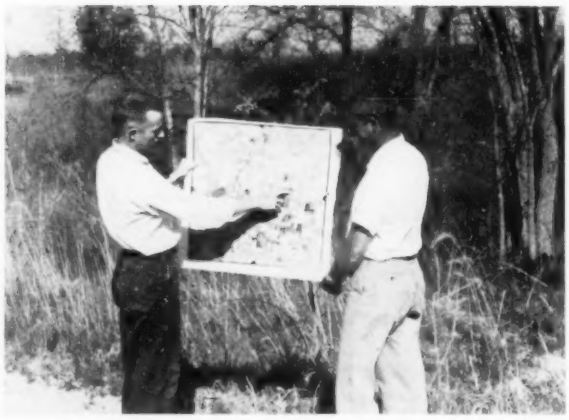
Some of our land is very flat and some quite hilly. Checking areas on the flat land sounds almost impossible with these prints but we actually find that except for rare cases it has proven more accurate than field checks alone. This land in some cases has less than six inches of fall per mile and if we were to use ordinary "eye judgment", we could and would have been in error. Taking levels of entire sections or more of land to determine drainage divides is prohibitive in time and cost. So we have turned to our photos for these areas.

In the hilly section of our county, drainage areas are very easy to ascertain except when heavily wooded and when photos were taken during months of heavy foilage. These cases are few but can be overcome by checking a soil map put out by the Government showing stream and creek drainage lines. In our rough land, roads are not as prevalent and therefore checking areas by photos saves much walking and time of engineering personnel.

We have had several cases where we have replaced bridges with smaller structures such as: a 40 foot bridge replaced by a 4′x4′ culvert; a 26-foot span bridge with a 6′x6′ box; a 32-foot bridge by an 8′x8′ box; and a 14-foot bridge with a 36-inch pipe. Most of these structures had been placed with the assumption that a certain size had once been used and therefore the same size or larger should be placed again. In these four cases merely a check of the photos saved approximately $18,000 to $25,000.

Determination of the run-off characteristics of the drainage areas are very important. The photo is

● MAP READY for use: At the left is the author, M. B. Larsen; at the right is Robert Shaffer, Ass't Co. Engr.



● ORIENTATION in the field, using the aerial map. At left is William Hayward, office clerk; at the right Mr. Shaffer

most helpful in permitting a quick decision as to whether it is farmed, grassed or wooded. Of course the steepness of the slopes cannot be ascertained since we do not have stereoscopic photos.

Another use is that of determining section lines and likely positions of section corner points. The photos, of course, are too small in scale (8 inches to the mile) to determine the exact position, but fence lines, hedgerows, old roads and old farm sites show up on the photos and are used to determine general area for hunting for "lost" corners.

The photos turn into public relations data also. A landowner, farmer or tenant comes to the office, scribbles a few lines on a piece of paper and both they and the office staff are more confused. An aerial photo of his farm is produced and he stands in wonderment as you indicate his house, his barn, his trees, fence rows, his neighbor and even his rows of oat shocks. He then explains his difficulty and every one is the wiser. You have here helped yourself and your client.

In some cases field tile drains are located by viewing the photos. This not only delights the landowner but many times saves future maintenance costs in fixing these tile if they are located before the road is constructed; or they may even be used for drainage of the road itself.

Of course, one big advantage in using the photos is for laying out tentative relocations of roads. The possibility of these relocations can readily be seen from the photos. Corner posts, telephone poles, buildings and fence lines are used as control points. Survey parties then run lines from these points and only slight changes are necessary in most instances. Saving in time here is inestimable but also clearing in heavily timbered areas for survey parties is kept to a minimum by predetermining the approximate center line. These are for local county roads carrying all the way from 10 to 350 vehicles per day, but even here we save time and money.

The prints cost us nothing since they were outdated photos. Their use in determining drainage areas is estimated to save a day or two of an engineer's time on each bridge design. This amounts to $15-$30 per bridge, which is very little; but it will allow that same engineer to design an extra bridge or so each year. The saving in determining culvert drainage areas is about two hours per mile of new construction. Of course vehicle cost on both items is eliminated also and this is estimated to save 5000 to 7500 miles of driving per year.

We've found many uses for these prints though and are looking forward to acquiring a set of up-to-date overlapping prints for further economy and saving of field work.

Sanitary Landfill Reclaims Strip Mine Area

BOTH city and private refuse collectors use the sanitary fill operated by the City of Danville, Ill. This is a strip mine area bordering the city. Since a strip mine area is pretty much useless as it is, the landfill represents a reclamation project for the future. The city operates 7 enclosed type trucks for collection. These bring in about 500 tons of refuse monthly. In addition, agreements have been worked out with 45 private collectors in the area. These average 3 or 4 tons per trip. No charge is made private collectors for disposal, the use of the city landfill operating to prevent dumping in and around the city. City collections serve about 45,000 people. An HD-116 Allis-Chalmers tractor shovel is used at the fill. Collection trucks work 5 days a week.

PUBLIC RELATIONS on a HIGHWAY CONSTRUCTION JOB

K. R. McDONALD

IN HIGHWAY construction, an area of public building and engineering activity which all too often has suffered criticism for its lack of the so-called "public relations" touch, the Guy F. Atkinson Co., with headquarters at South San Francisco, is a firm which has successfully set a pattern other contractors everywhere could profitably follow.

One of the biggest heavy construction jobs ever undertaken in the San Francisco Bay Area, the building of the complicated Waldo Grade on U. S. Highway 101, has now been completed by the Atkinson firm with nothing but compliments for a fast moving, efficiently conducted construction job carried out with the public watching every move of men and machines. The project involved widening of Highway 101 to eliminate a major traffic bottleneck which existed between the Golden Gate Bridge and the Richardson's Bay Bridge.

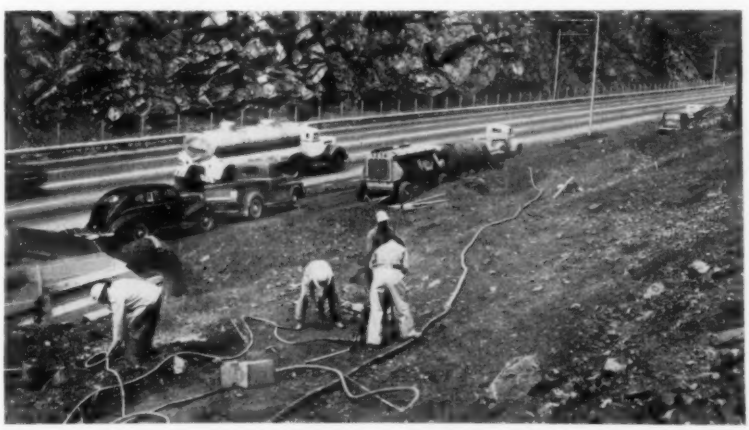
● **COMMUTER traffic presented contractor with several critical problems.**

● **CONSTRUCTION will eliminate a bottleneck at the Golden Gate Bridge.**

Although a comparatively short stretch of highway construction, the contract presented several critical problems, filled with potential headaches for both the contractor and the thousands of motorists who are required to use the highway in their twice a day commuting to San Francisco. It was necessary to get the work finished as quickly as possible with an absolute minimum of interruption in the heavy flow of traffic on the highway which is San Francisco's only direct line from the agricultural and lumber producing areas of Northern California.

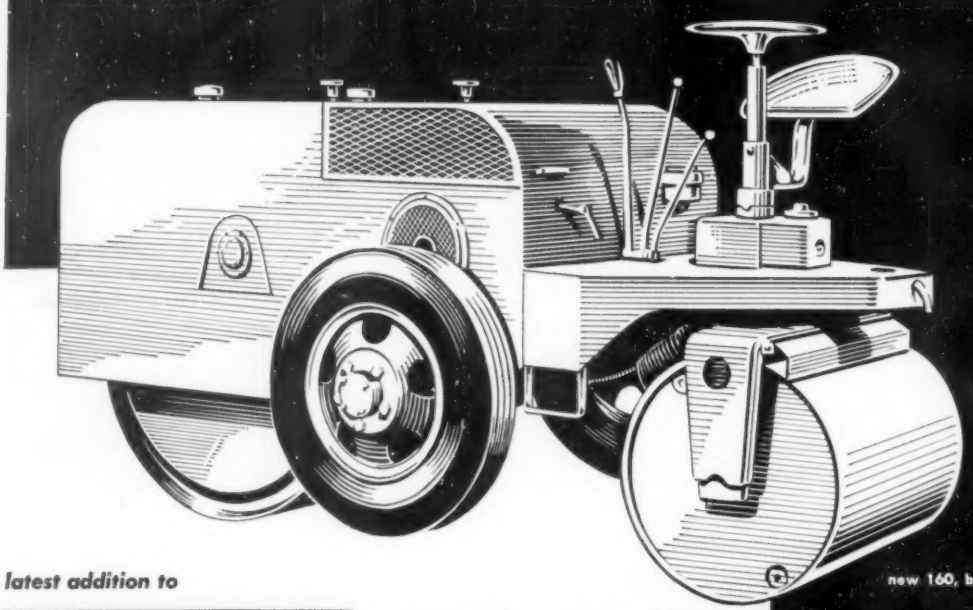
"Perhaps the greatest volume of comment," explains George Atkinson, president of the firm, "resulted from the fact that commuters returning home from work at San Francisco could see the tangible, visible results, of the day's work by our crews. Thus thousands were able to follow in detail almost every step we took in laying out and executing this complicated construction project."

Traffic watchmen were under constant scrutiny by men assigned by Mr. Atkinson to see that "politeness and courtesy was the rule" at all times. No traffic hold-ups were permitted and blasting and tunneling were scheduled for those periods when traffic was at its lightest. Flag-men in small trucks constantly kept traffic moving over the one-way section in breaks carefully timed so that no car would have to remain halted for any appreciable amount of time.



● **WORK was planned and equipment used to produce visible results each work day.**

NEW 3-5 TON ROLLER



new 160, bulletin 32

latest addition to

LITTLEFORD portable roller line

Out of the Littleford engineering and development center has come the latest addition to the Littleford portable roller line – the new 3-5 ton Model 160 . . . featuring

★ **the first complete power steering** that brings pleasure-car steering ease to this 5-ton giant. No difficult steering lever to grapple with. Mechanical steering in reserve.

★ **hydraulic lift.** Change from trailing-to-rolling-to-trailing positions effortlessly, hydraulically, with a flip of a switch. Wheels need not be removed.

★ **rolling with trailing wheels in position** . . . wheels move up to high position of 5″ above rolling surface. Can be removed easily and quickly if necessary.

★ **compaction** when ballasted of 173 lbs./lineal inch on main roll, 91 lbs./lineal inch on small roll.

★ **maximum stability** provided by the 48″ diameter x 38″ wide main roll and the 30″ diameter x 36″ wide small roll.

★ **ease of maintenance.** Clutch located outside for easy adjusting.

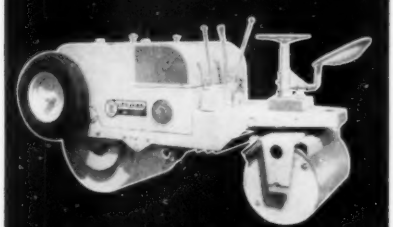
★ **19.5 hp air-cooled engine** delivers plenty of power when rolling up steep grades and thru soft base material.

★ **2 speeds forward and reverse.**

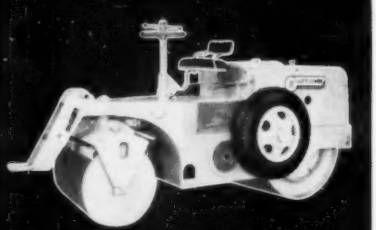
Now, with the introduction of the Model 160, there's a Littleford portable roller for every requirement. Send today for descriptive bulletins. Littleford Bros. Inc., dept. LB 215, 452 E. Pearl St., Cincinnati 2, Ohio.

LB LITTLEFORD

world's most complete line of completely engineered black top equipment



Model 157, 2-3 tons, bulletin 24

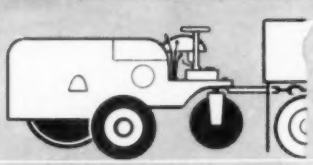


Model 185, 4-6 tons, bulletin 20

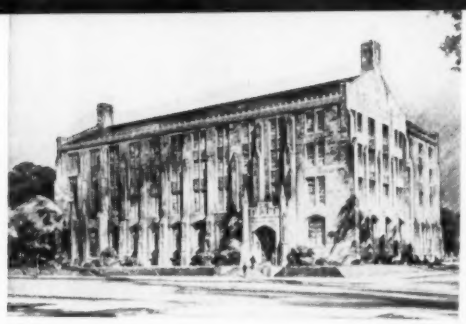
HYDRAULIC RAISING AND LOWERING

Unit in normal rolling position.

Hydraulic ram raises pulling tongue to engage towing truck pintle hook.



Pneumatic trailing wheels in trailing position with pulling tongue hitched to tow truck.



NEWS BULLETINS

AMERICAN PUBLIC WORKS ASSOCIATION, 1313 EAST 60th STREET, CHICAGO 37, ILLINOIS

Preliminary Program of 1956 Public Works Congress and Equipment Show

THE 62ND ANNUAL Public Works Congress & Equipment Show, sponsored by the American Public Works Association, will be held in the Will Rogers Memorial Auditorium, Coliseum and Exhibit Building in Fort Worth, Texas, September 23-26, 1956. About 1500 are expected to be on hand for this event which brings together public works engineers, administrators, contractors and equipment manufacturers from all parts of the United States and Canada.

The first day will be devoted to the registration of delegates; a review of one of the largest displays of public works equipment ever assembled in the Southwest, and a Get-Acquainted Party. The opening session on Monday morning, September 24, will feature a talk—"Panorama Across the Pond" by N. M. Wilson, President of the International Association of Public Cleansing, Edinburgh, Scotland; a paper on "Conservation of Water Resources" by R. M. Dixon, Chairman of the State Board of Water Engineers, Austin, Texas; and the Associations' annual business meeting. This will be followed by a buffet luncheon at which time the activities of the 25 local chapters will be discussed. The afternoon session will include a talk on "The Federal Highway Program" by A. C. Taylor, Division Engineer of the U. S. Bureau of Public Roads, and a forum on "Employee Development in Public Works". S. G. Gentile, Administrator, Department of Public Works, Detroit, Michigan, will lead the forum discussion. Other participants include W. D. Heisel, City Personnel Officer, Cincinnati, Ohio; John E. Miklos, Training and Education Administrator, Miami, Florida; Robert C. Garnier, Assistant Personnel Director, Milwaukee, Wisconsin; and Henry D. Harral, Supervisor of Municipal Assistance, Institute of Local and State Government, University of Pennsylvania, Philadelphia, Pa. The evening program features a Chuck Wagon Barbecue and Rodeo.

Tuesday morning will be devoted to a series of discussions on a wide variety of topics. The Chairman of each session will present a brief resume of current practices and problems on the assigned topic. Two commentators will then elaborate on the opening statement after which the audience will be invited to raise questions and participate in the discussion.

"Shirt Sleeve" Sessions

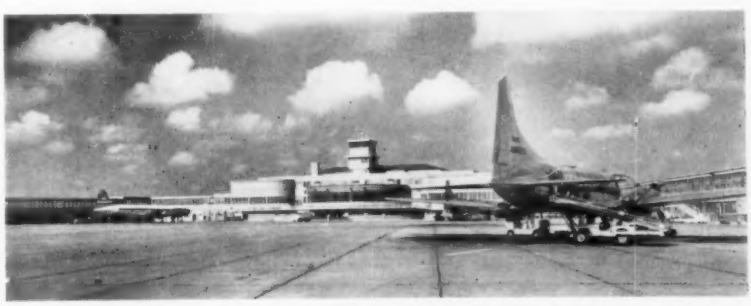
Refuse Disposal—Chairman: Leo Weaver, Sanitary Engr., U.S. Public Health Service, Washington, D.C. Commentators: Wm. A. Xanten, Supt., Div of Sanitation, Washington, D.C., and J. C. Albers, City Engr., Glendale, Calif.

Street Maintenance—Chairman: Roy McLeese, City Engr., Salt Lake City, Utah. Commentators: W. H. Moore, Supt., Highway Maint., Akron, Ohio, and T. H. Hever, Supt. Streets & Sewers, Salem, Mass.

Equipment Management—Chairman: Thomas Baldwin, Chief, Automotive Maint. Div., Philadelphia, Pa. Commentators: W. L. Fisher, Supt., Automotive Equipment, Dallas, Texas, and R. F. McBean, Supt., Automotive Equipment, Honolulu, Hawaii.

Organization—Chairman: Herman Pope, Exec. Director, Public Administration Service, Chicago, Ill. Commentators: K. K. King, Dir. of Public Works, Phoenix, Ariz., and F. D. Kuckuck, Dir. of Public Works, Wauwatosa, Wisc.

Public Bldg's & Grounds—Chairman: Jean L. Vincenz, Dir., Dept. of Public Works, San Diego County, Calif. Commentators: C. R. Hayden, Deputy Regional Director, U. S. Public Bldg. Service, Dallas, Texas, and L. J. Washer, Chief, Bur. of



● **A VIEW of Amon Carter Field, Greater Fort Worth International Airport.**

OFFICERS: Edward P. Decher, Newark, N. J., *President;* Frederick W. Crane, Buffalo, N. Y., *Vice President, Eastern Area;* Kenneth K. King, Phoenix, Arizona, *Vice President, Western Area;* Walter M. Swietlik, Milwaukee, Wisconsin, *Vice President Central Area;* Albert G. Wyler, New Orleans, La., *Vice President, Southern Area.* DIRECTORS: W. D. Hurst, Winnipeg, Manitoba, Canada; Sol Ellenson, Newport News, Virginia; Roy W. McLeese, Salt Lake City, Utah; Jean L. Vincenz, San Diego, California; Warren A. Coolidge, Nashville, Tenn., *Immediate Past President;* Donald F. Herrick, *Executive Director.*

NOW! Repair Pipe Leaks

Quickly Permanently Economically

with the NEW ATLAS PIPE TOOL and PIPE PATCHES

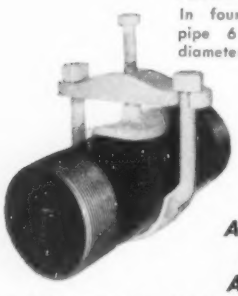
Developed after years of research and testing, no other tool—no other method known today—will repair pipe leaks as quickly, as permanently, and as economically as the new patented Atlas Pipe Tool and Patches. And without shutting off lines!

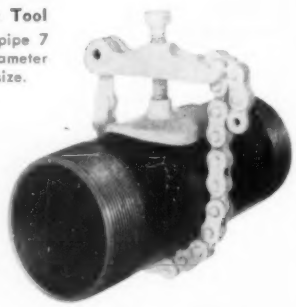
The unique Atlas Pipe Tool is simplicity itself. It consists of a sturdy, but lightweight, clamp easily handled by one man. A working space of only a few inches larger than the diameter of the pipe is required even if leak occurs at the bottom of the pipe. The patches, made of steel with neoprene gaskets, are accurately shaped to fit specific pipe sizes—assuring a skintight fit when gasket is compressed. When welded, the patch becomes a permanent part of the pipe—as strong as the pipe itself.

Two Types Available

Saddle Type Tool — In four sizes for pipe 6 inches in diameter and less.

Chain Type Tool — In sizes for pipe 7 inches in diameter up to any size.





ATLAS PIPE TOOL AND PATCHES ARE INEXPENSIVE

Prices range from $10.00 for the smallest size tool to $45.00 for the 36" size; patches cost from $1.50 for the 1" to $4.00 for the 36". A complete price list is yours for the asking.

Ask Your Favorite Dealer for Detailed Information, or Write Atlas Industries, Inc.

HERE'S HOW THE ATLAS PIPE TOOL WORKS

Tool and patch applied by one man in approximately 30 seconds, instantly stopping leak.

When convenient patch is welded to pipe.

Where welding is hazardous, patch is cold-welded to pipe and allowed to dry for 24 to 48 hours.

Tool is removed leaving Patch on Pipe—almost as strong as pipe itself.

ATLAS INDUSTRIES, INC.

Manufacturers of Patented Atlas Pipe Tool and Pipe Patches

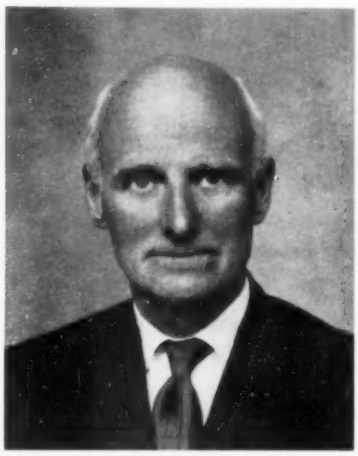
General Offices and Warehouse
5601 Armour Drive

Mailing Address—Houston, Texas
P. O. Box 8152—WAlnut 6-5789

Operations, Dept. of Public Works, Richmond, Virginia.

Traffic & Parking—Chairman: P. M. Linscott, Project Engr., DeLeuw, Cather & Co., Chicago, Ill. Commentators: R. K. McGillivary, Dir. of Public Works, Bay City, Michigan, and Wm. R. Wooten, City Engr., Tulsa, Okla.

Sewage Disposal—Chairman: John F. Laboon, Exec. Dir. & Chief Engr., Allegheny Sanitary Authority, Pittsburgh, Pa. Commentators: Drahn Jones, Dir. of Public Works, Corpus Christi, Texas, and K. B. Stallings, Dir., Dept. of Public Works, Nashville, Tenn.



● **NORMAN G. WILSON, Lighting and Cleansing Manager for the City of Edinburgh, Scotland, and president of the International Assn. of Public Cleansing, who will present a paper at the Fort Worth Meeting.**

Refuse Collection — Chairman: W. A. Schneider, Dir., Bur. of Sanitation, Los Angeles, Calif. Commentators: Dale Garst, Dir., Dept. of Refuse Collection, Wichita, Kansas, and G. N. Coleman, Supt., Refuse Division, St. Petersburg, Florida.

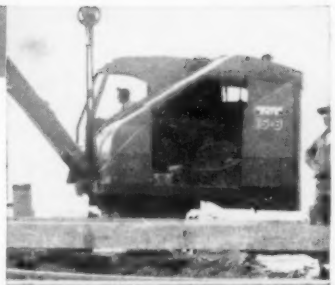
Street Sanitation — Chairman: Hugo Erickson, City Engr., Minneapolis, Minn. Commentators: H. O. Patton, Supt. of Sanitary Services, Denver, Colorado, and F. Dow Hamblin, Comr., Dept. Public Works, Rochester, N. Y.

Financing Public Works—Chairman: J. F. Davis, City Manager, Fort Worth, Tex. Commentators: V. H. Hurless, City Comptroller, Milwaukee, Wisc., and M. P. Phillips, Comr., Dept. of Public Works, Augusta, Georgia.

Street Design & Construction—Chairman: S. C. Palmer, City Engineer, Kansas City, Mo. Commentators: James J. Sullivan, Supt.,

In Current Salt Lake City Project

CLAY PIPE PROTECTS PUBLIC HEALTH



THE SALT LAKE CITY SUBURBAN SANITARY DISTRICT is expanding its sewerage program with bond-financed projects totalling $8,890,000 and requiring thousands of feet of Vitrified Clay Pipe. The men who design and build basic public health facilities like these rely on Clay Pipe for its unmatched dependability. Engineers planning the Salt Lake installation specified Clay Pipe for its "permanence and low cost."

Clay Pipe is completely unaffected by strong detergents, sewer gases, acids generated by sewage, and industrial wastes. It's chemically inert, so it never wears out. Wherever public health is at stake, it pays to insist on the *longest-lasting* sewer pipe. Always specify Vitrified Clay Pipe, in the new longer, stronger sections, developed through the Clay Pipe Industry's new research program. Clay Pipe is backed by a *guarantee no other pipe matches.*

Officials directing the Salt Lake project include: District Trustees; A. F. Stewart, L. B. Gunderson, and R. P. Greenwood. *Consulting Engineers;* Caldwell, Richards & Sorenson.

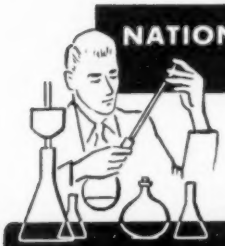
Vitrified

CLAY

CLAY PIPE NEVER WEARS OUT!

PIPE

C-206-11



NATIONAL CLAY PIPE MANUFACTURERS, INC.
1820 N. Street, N.W., Washington 6, D. C.

206 Connally Bldg., Atlanta 3, Ga.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

Progress in Public Health - Through Clay Pipe Research

Streets & Engineering, Springfield, Mass., and J. M. Tippee, Dir. of Public Works, Des Moines, Iowa.

Street & Highway Lighting—Chairman: A. D. Harrington, Public Lighting Engr., General Electric Co., Hendersonville, N.C. Commentators: H. W. Kurtz, Pres., Board of Public Works, St. Joseph, Mo., and B. J. Swanson, Pres., Board of Public Works, Ft. Wayne, Ind.

Other Sessions

The Tuesday afternoon session will feature a paper "Applications of Electronics in Public Works" by Howard Jacoby, Associate Editor, Engineering News-Record, New York City, and a forum on "Drainage Problems in Urban Areas." H. H. Stirman, Director of Public Works, Dallas, Texas, will be Chairman of this forum which will include the following participants: Brigadier General L. E. Seeman, Southwestern Division Engineer, Army Corps of Engineers; Charles R. Velzy, Nussbaumer, Clarke & Velzy, Consulting Engineers, New York City; George L. Nampa, Director of Public Works, Royal Oak, Michigan; and Charles W. Cooke, Director, Park River Flood Control District, Hartford, Conn. A special presentation of the "Gruen Plan for Greater Fort Worth" is scheduled for Tuesday evening.

The program for Wednesday morning includes a paper by Andrew W. Mulrain, Commissioner, Dept. of Sanitation, New York, N.Y., "An Action Program for A Cleaner City", and a paper on "Advance Planning of Public Works" by Major General J. S. Bragdon, (U.S. Army Ret.), Special Assistant to President Eisenhower. This will be followed by a forum on "Integration and Coordination of Public Works", with Mayor Ben West of Nashville, Tenn., serving as Chairman of the discussion. The participants include: Ed E. Reid, Executive Director, Alabama League of Municipalities; Dr. August O. Spain, Chairman, Dept. of Government, Texas Christian University, Fort Worth, Texas; Dennis O'Harrow, Executive Director, American Society of Planning Officials, Chicago, Illinois; and Lyall Pardee, City Engineer, Los Angeles, California.

Equipment Show

The Equipment Show will be open from 9 A.M. to 5 P.M. Sunday through Tuesday, and from 9 A.M. to noon on Wednesday. The entire afternoon of the closing day of the Congress will be devoted to a review of field demonstrations of various types of equipment displayed at the Equipment Show.

A Social Hour sponsored by the International Harvester Co. will precede the annual banquet which will feature R. E. (Prof.) Jackson of Denton, Texas, as the guest speaker. An interesting and entertaining program has also been planned for the ladies. Hotel accommodations may be obtained by writing to E. H. Carter, Chairman, Housing Committee, 1956 Public Works Congress & Equipment Show, % Fort Worth Chamber of Commerce, 114 East Eighth Street, Fort Worth 2, Texas.

• • •

Revenue From Ohio Turnpike

All records for revenue in any comparable period were excelled during the first 10 days of June, 1956, when an estimated $473,000 was realized from tolls and concessions on the Ohio Turnpike. The Ohio Turnpike Commission needs about $39,000 a day for all expenses of the Commission including the reserves required to service its $326,000,000 debt.

Fast-working steel cutters mounted on drum-type tool smoothly shave off paint lines without hurting pavement. Leaves uniformly clean surface.

New portable TENNANT machine...

removes traffic lines in 1 fast operation

For about 1¢ per foot... this machine provides a practical method of erasing old traffic lines. Does a complete job—without need for extra equipment, chemicals or large crews. Works up to 5 times faster than other methods. Easy handling makes it ideal for use on streets, highways, parking lots, airports, etc. Works during normal hours without tying up traffic.

Does permanent job without injury to pavement

Machine has self-propelling action. Operator merely guides it over traffic lines. Cylindrical tool with scores of steel cutters revolves at 1450 rpm—smoothly shaves off paint in one operation. Covers path 4" wide; adjustable to cover path up to 7" wide.

- Works up to 5 times faster than other methods.
- Erases paint lines permanently; does not hurt surface.
- Portable . . . one-man operation . . . has self-propelling action.
- Works during normal hours without tying up traffic.
- May be used on concrete or asphalt.
- Covers path 4" wide; adjustable up to 7" width.

Write today for details. G. H. TENNANT COMPANY
2578 N. 2nd Street, Minneapolis 11, Minn.

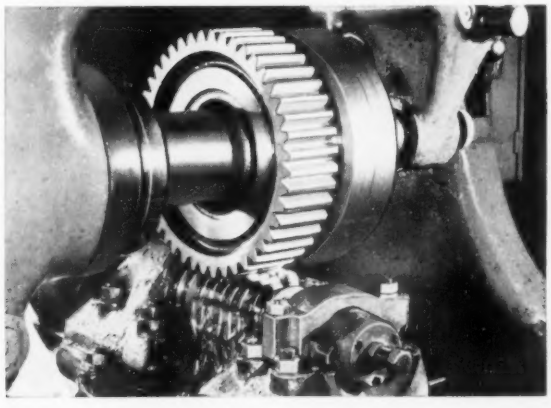
TENNANT TRAFFIC LINE REMOVING MACHINE

SPECIALIZED MAINTENANCE EQUIPMENT

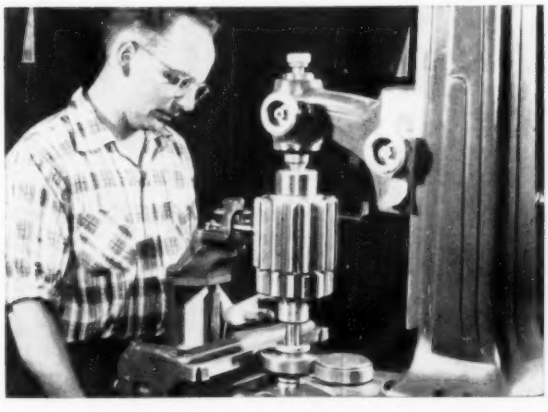
Your community-owned Allis-Chalmers equipment deserves *True Original Parts*

Why? Because they meet design, manufacturing, inspection and packaging standards that assure long life... budget-stretching low-cost operation.

DESIGNED WITH THE ORIGINAL EQUIPMENT. Each Allis-Chalmers True Original Part benefits from a fine metallurgical research program. Each is designed by experienced engineers to do its full share of the work . . . just as each component in your Allis-Chalmers machines did when this equipment was new.



PRODUCED ON MODERN MACHINES BY SKILLED CRAFTSMEN. Here's where modern manufacturing equipment and know-how combine to produce precision parts. This combination is the reason you can be sure of getting full work power from any Allis-Chalmers equipment in which True Original Parts are used.



CAREFULLY INSPECTED FOR PRECISION FIT. Every Allis-Chalmers part goes through rigid original-equipment inspection processes and testing routines. Gears are checked many times — for perfect meshing, true balance, full capacity.

PROPERLY PACKAGED FOR LASTING PROTECTION. Many are specially treated to protect against rust and dust. Others are safety-packed to guard against nicks, scratches or handling damage.

True Original Parts are available at your Allis-Chalmers Construction Machinery dealer — where factory-trained servicemen are on hand to help you at all times.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Emergency and Disaster Planning for Water and Sewerage

THE NECESSITY FOR developing workable measures to be effective for water works and sewerage systems in case of emergency is discussed in a booklet issued by the Water and Sewerage Industry and Utilities Division, Business and Defense Services Administration, Dep't. of Commerce, which outlines some factors in such planning.

One of the principal features of the suggested plan is that, upon the declaration of an emergency by the governor of a state, all water utilities in the state will be operated as one unit. The same will apply to sewerage systems. Mutual aid will be provided between utilities in the form of manpower, materials and equipment. This requires state-wide planning and organization and it also requires that municipal water and sewer officials occupy responsible positions in both local and state Civil Defense establishments.

Under the mutual aid plan, each water (or sewerage) utility becomes a part of a state-wide organization with facilities and authority to provide needed assistance during any emergency or disaster. In cities or metropolitan areas lying near or across state lines, interstate organization and action may be necessary.

Important areas requiring cooperation and understanding between the water and sewerage utilities and other agencies are listed as follows:

1. Transportation services for additional equipment and fuel as needed for hauling personnel, equipment, material and emergency water supplies.

2. Engineering services for supplying construction equipment, handling removal of debris, repairing sewers as they affect water supply operations, and furnishing other engineering and construction assistance. Water, sewerage, gas, electric, and each other utility should have a representative on the staff of the Chief of Engineering Services to provide liaison and participate in making decisions involving the utilities.

3. Medical and health services for control of sanitary quality of water supply during emergencies, particularly for tests of auxiliary and emergency supplies and where water utility forces are not available for such work.

4. Evacuation and welfare services for information on availability of water supply at possible locations of care and evacuee reception centers. Water utilities to advise how information will be supplied as to where such services can obtain emergency water supplies.

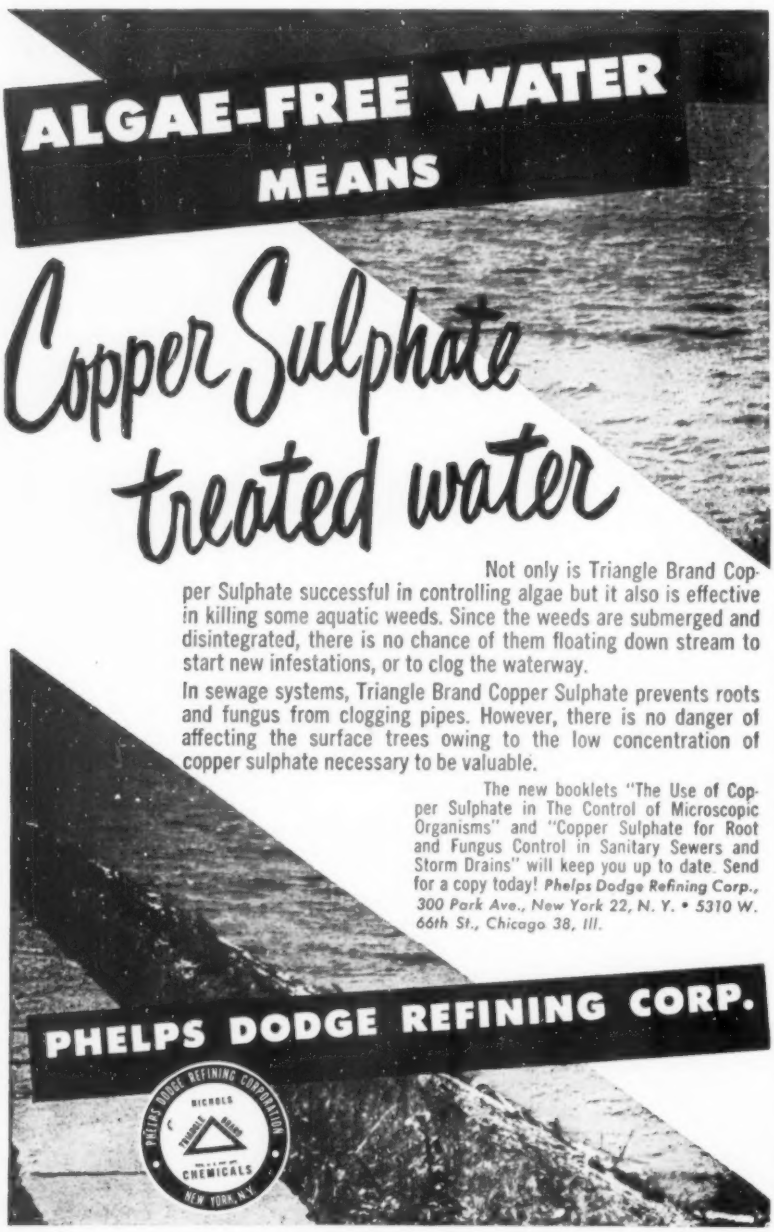
5. Fire services to cooperate in determining procedures to be followed in establishing fire lines and related adjustments in water distribution systems.

6. Police services to furnish passes for water utility personnel and control ingress to affected areas.

7. Public information services to inform the public regarding use and conservation of the water supply and where water may be obtained in case the distribution system is not functioning.

8. Civil Defense authorities should have knowledge of the general plan for operation of water supply facilities in time of disaster.

Stockpiles of water works equipment and supplies have been established by the FCDA near most target areas throughout the United


ALGAE-FREE WATER
MEANS
Copper Sulphate
treated water
Not only is Triangle Brand Copper Sulphate successful in controlling algae but it also is effective in killing some aquatic weeds. Since the weeds are submerged and disintegrated, there is no chance of them floating down stream to start new infestations, or to clog the waterway.
In sewage systems, Triangle Brand Copper Sulphate prevents roots and fungus from clogging pipes. However, there is no danger of affecting the surface trees owing to the low concentration of copper sulphate necessary to be valuable.
The new booklets "The Use of Copper Sulphate in The Control of Microscopic Organisms" and "Copper Sulphate for Root and Fungus Control in Sanitary Sewers and Storm Drains" will keep you up to date. Send for a copy today! Phelps Dodge Refining Corp., 300 Park Ave., New York 22, N. Y. • 5310 W. 66th St., Chicago 38, Ill.
PHELPS DODGE REFINING CORP.
PHELPS DODGE REFINING CORPORATION
NICHOLS
CHEMICALS
NEW YORK, N.Y.

sharp curve in the driveway section of Abington School in a Philadelphia suburb.

For more gentle radius curbs, Heltzel Straight Curb Forms were used. Abington School required approximately two miles of curbing.

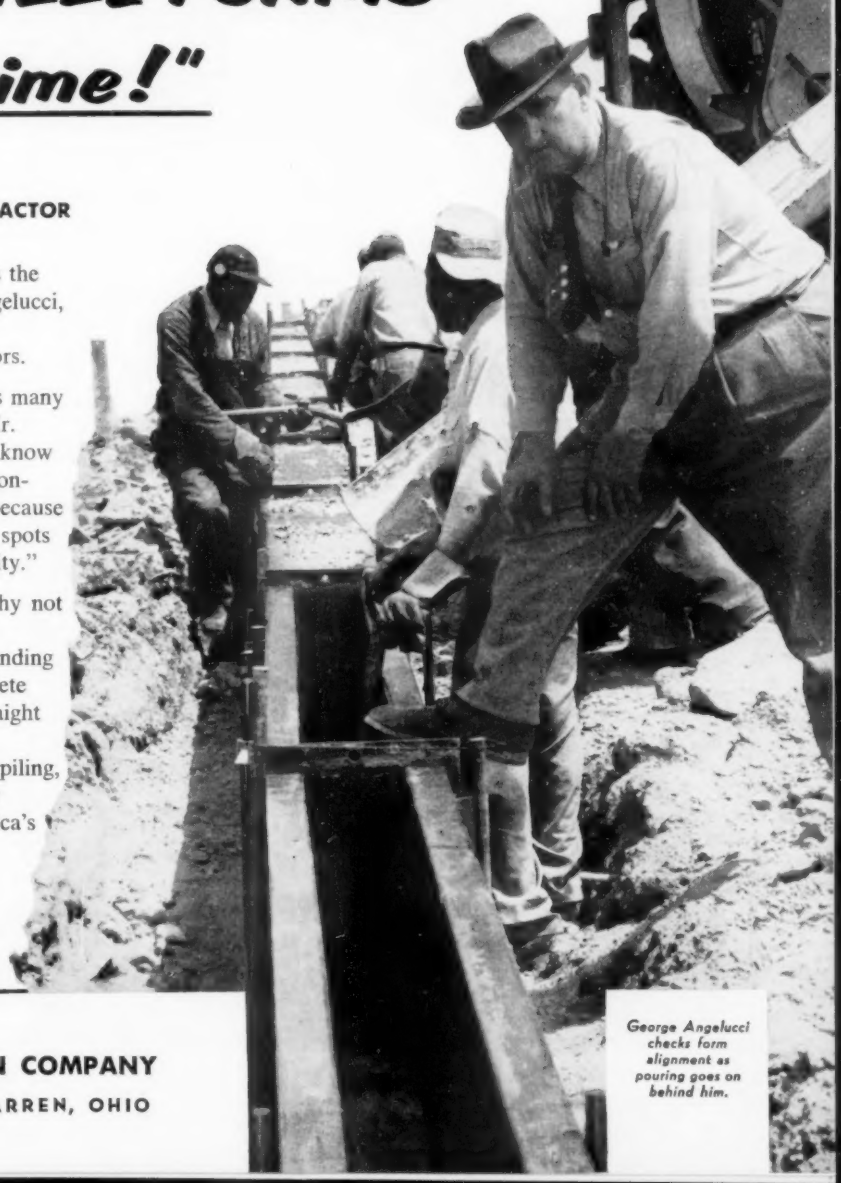
"For my money, I'll take HELTZEL FORMS ...everytime!"

SAYS LEADING PHILADELPHIA CONTRACTOR

"I've used them all, and I'll say Heltzel builds the best line of forms I know of," says George Angelucci, partner of Polselli & Angelucci, one of Philadelphia's best known curbing contractors.

"My form setting crew can set a third again as many Heltzel Forms as other makes," continues Mr. Angelucci. "What's more, Heltzel engineers know the industry, and design their forms to the contractor's advantage. There's no form bowing because the stake pockets are placed in just the right spots to give the form maximum strength and rigidity."

If you haven't as yet tried Heltzel Forms, why not take the advice of leading contractors—like Polselli & Angelucci—and use the one outstanding form available today. Heltzel builds a complete line of steel forms for any concrete job — straight curb, radius curb, curb and gutter of any description, sidewalk, driveways, foundations, piling, island, etc. Next time — specify "Forms by Heltzel" — for almost half a century America's leading form manufacturer.



George Angelucci checks form alignment as pouring goes on behind him.

THE HELTZEL STEEL FORM AND IRON COMPANY

89801 THOMAS ROAD · WARREN, OHIO

0021

States. These stockpiles are available to the water utilities under disaster conditions. Prior arrangements should be made with authorities in charge of such stockpiles so that material and equipment can be obtained quickly when needed. A survey should be made of supplier's inventories, chlorine used for other purposes in the area, and equipment normally used by others that could be diverted to the utility's use under disaster conditions. Regardless of the availability of emergency stockpiles, it is important that each utility be prepared and self-sufficient within practical limits.

Water utilities are organized to cope with emergency situations. Instructions should be prepared for all personnel as to where to report and what to do. While volunteers from other occupations might be of some assistance, no reliance should be placed in their ability to perform water works duties. Pre-planned assistance should come from adjoining and outlying water utilities. With this in mind, contact should be made with other water utilities in the immediate and outlying areas for the express purpose of familiarizing each utility's personnel with the operational procedures of neighboring water utility systems. Water system records, maps and drawings of critical installations should be prepared in duplicate, and secured in a place that is known to all utilities in the region.

Ordinarily, the repair of broken sewers is of less urgency than the repair of broken water mains. Sometimes, however, it becomes equally important when adjacent sewers and water mains are broken or destroyed at the same time. In any event, early restoration of damaged sewer systems is essential, not only from the standpoint of public health but because repairs to other underground utilities may have to wait until the sewers are repaired.

In the case of sewage pumping and ejector stations, the continuity of service is likely to depend upon the restoration of power although it is possible for such stations to be physically damaged. As part of the general sewerage system, early restoration to service of such stations is as important as repairs to sewers.

Sewage treatment plants may be given a high order of priority for repair only in those cases where public water supplies may be affected by the pollution.

To provide continuity of service in those parts of the sewerage system where this is essential, much the same procedures can be employed as in the case of water systems. Sewer departments as a rule do not have the close contacts with similar departments in other municipalities as do water departments. Furthermore, in the smaller towns, sewer departments are likely to be less prepared to execute repairs quickly than are the water departments. Consequently, sewer departments may need to call upon other than sewer departments, for help or to call in outside construction contractors.

Under some circumstances, temporary sanitary conveniences may have to be provided.

• • •

Village Lighting System

The entire Village lighting system of Oak Ridge, Illinois, is operated, under the direction of the Village Engineer, and maintained by three electricians, one helper and one lamp washer. The three electricians do the necessary maintenance work.

designed by a champion for championship performance

American Approved

Jim Patterson's Lifetime ALUMINUM Diving Board

World's Finest Official Regulation Board

Lifetime Construction, Unequaled Performance and Safety

RADICALLY DIFFERENT in design and construction, unequaled in performance by any other board you've seen.

BUILT LIKE AN AIRPLANE WING — Aircraft structural design combined with spring-leaf principle and heat-tempered, specially alloyed aluminum are joined in an assembly of great strength, uniform flexibility and incomparable springing qualities.

PRACTICALLY UNBREAKABLE — Many times stronger than actual load requirements—will withstand severest use day after day, yet continue to give unmatched performance and maximum springing action year after year, free of repairs or replacement.

SPRING-LEAF CONSTRUCTION gives much greater strength at fulcrum where needed, and lightness at tip.

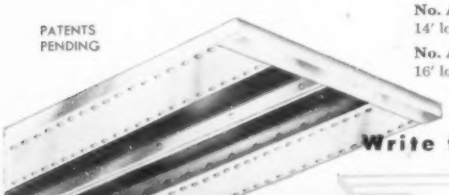
EFFORTLESS TAKE-OFFS, MORE HEIGHT WITH LESS EFFORT — No other board has such buoyant springing qualities or is so stable underfoot. Built-in resilience lasts as long as the board.

SAFEST DIVING BOARD EVER DESIGNED — Aircraft structure eliminates torque (twisting action) at tip of the board. Battleship Safety Tread, 18" wide, safest non-slip covering known.

WEIGHS LESS than conventional wood or coated wood boards, easier to install or remove. The only board that fits *any* regulation diving standard.

ENDS BROKEN BOARD PROBLEM — eliminates repair and replacement expense indefinitely, pays for itself in a few years. The entire board is anodized for permanent protection against salt water and all corrosion.

PATENTS PENDING



No. APL-14 Lifetime Aluminum Board 14' long, weight 130 lbs..... **$325.00**

No. APL-16 Lifetime Aluminum Board 16' long, weight 140 lbs..... **$325.00**

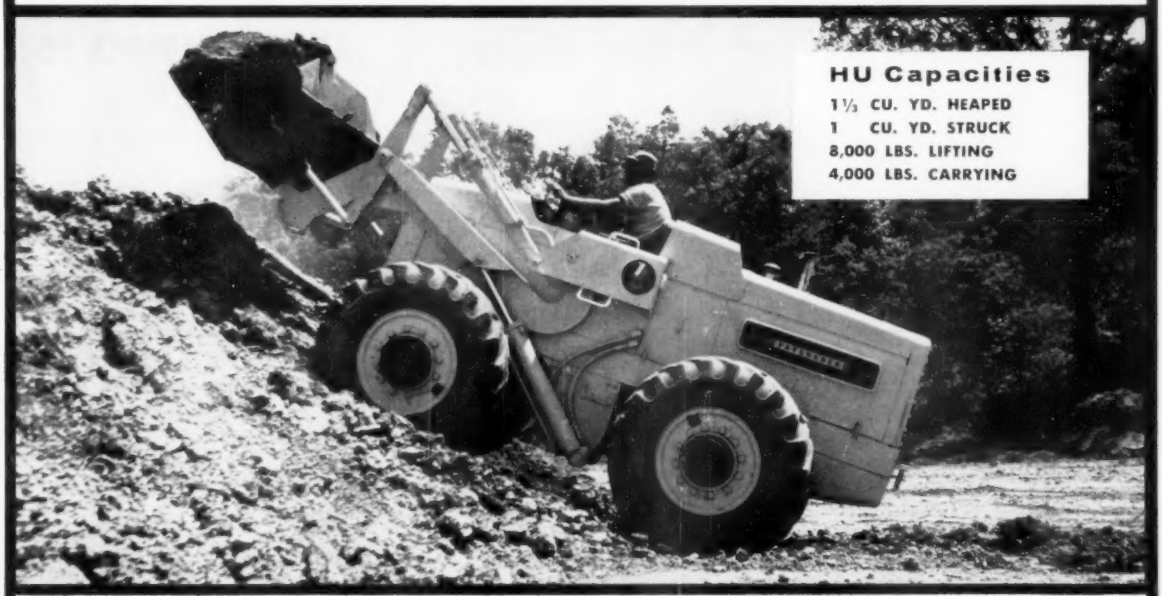
Write for Literature

EXCLUSIVE DISTRIBUTORS

WORLD'S LARGEST MANUFACTURERS OF FINE PARK, PICNIC, PLAYGROUND, SWIMMING POOL AND DRESSING ROOM EQUIPMENT

AMERICAN PLAYGROUND DEVICE CO.
ANDERSON, INDIANA, U.S.A.

new PAYLOADER® model



for PUBLIC WORKS use

Street, Highway, Park and Sanitation Departments will find this "PAYLOADER" is just what they've been looking for in an all-purpose tractor-shovel — in size, features, and in all-year usefulness. A demonstration will quickly convince you that it is the most effective and efficient tractor-shovel for its size ever offered. Its all-wheel drive PLUS exclusive power-transfer differentials assures reliable traction for all kinds of ground conditions — sand, gravel, mud, ice and snow.

All the other finer features of the larger 4-wheel-drive "PAYLOADER" models are also built into this smaller machine, and it has a full dumping clearance of 7'10" to load high trucks. Your "PAYLOADER" Distributor is ready to show you the Model HU and what it can do. The Frank G. Hough Co., 710 Sunnyside Ave., Libertyville, Ill.

ATTACHMENTS FOR MANY APPLICATIONS

- Pick-up Street Sweeper
- Crane Hooks
- Rotary Snow Plow
- Operator Cab
- Snow Buckets
- Hydraulic Back-Hoe
- Fork Lift
- "V" and Blade Snow Plows

FEATURES

- Power-transfer Differentials
- Planetary Final Drives
- Power-shift Transmission
- 40° Bucket Tip-back at ground level
- Powerful Pry-out Bucket Action
- Rear-wheel Power Steer
- Four-wheel Power Brakes
- Hydraulic-System Load Shock Absorber

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
761 Sunnyside Ave., Libertyville, Ill.

Send data on "PAYLOADER" Units
4-wheel drive types:

☐ Model HU 1⅓ yd. heaped 1 yd. struck
☐ Model HH 1¾ yd. heaped 1½ yd. struck
☐ Model HO 2¼ yd. heaped 1¾ yd. struck
☐ rear-wheel-drive Model HF — 1 cu. yd.

Name _____
Title _____
Gov't. Unit _____
Street _____
City _____
State _____

INDUSTRY AND ESSENTIALS

AFFECTING COMMUNITY DEVELOPMENT

J. FERD. HOLTMANN,

Asst. Mgr., Industrial Development,

New York Central System,

Cincinnati, Ohio

TO PROVIDE for expansion of existing industry and to induce new industry to locate in or near a community, certain specific items are required in practically all instances.

Zoning is becoming an increasingly important factor. Industries today desire to be protected from encroachment by spotty and low-class residential construction. It is important for any community today to look to the future and have planning commissions or similar organizations functioning for the purpose of setting up or amending zoning regulations, so as to provide satisfactory industrial areas in advance of prospective use. Without proper provisions for land uses, many an opportunity to develop a community industrially is lost.

Water—The requirements of industry in this respect can, generally speaking, be divided into three broad categories. (a) Major water sites for manufacturing concerns requiring large quantities of industrial water for processing or cooling purposes, volumes reaching as much as 20 million gallons per day or more. The water in this volume, of course, is available from large rivers or streams or good underground supplies. Industries using this volume of water are, for example, synthetic fiber plants, pulp and paper mills, steam generating plants, and various types of chemical manufacturers. (b) Minor water sites where industries could obtain water to the extent of one million to as much as 10 million gallons per day. This volume of water would be used, generally speaking, for finishing plants and certain chemical operations. (c) Dry Sites. This terminology would apply to the requirements for industrial or warehouse sites for operations not requiring large quantities of processing or cooling water, but producing a demand primarily for a water supply for drinking, sanitation and fire protection. These demands may require anywhere from a very nominal amount of water, up to one million gallons per day or more. It is suggested that in planning for the improvement or expansion of a community's water system, full consideration be given not only to demands presently known, or for the immediately foreseeable future, but also to potential demands based on plans for the city in the future development of its present area and surrounding environs. A little larger line laid now would be an economy in providing future extensions and capacity as compared to the possible later need for an entirely new line perhaps from source of supply.

Areas and Acreage for Plant Sites—The trend toward larger industrial sites must be recognized. Many old sites are outmoded, particularly within the sometimes cramped areas of the city limits. The one-story, rather than the multiple-floor type of industrial building, the desire for possible expansion room, the need for off-street parking, and the desire to have areas for landscaping, are some of the reasons for the demand for larger sites. For example, an industry planning the construction of a building to cover about one acre of land would, generally speaking, seek a site of at least from three to five acres. Such a plant might employ from 50 to as many as 300 or 400 persons, depending upon the nature of the operation. A medium sized operation generally requires a site of from 10 to 20 acres, and sometimes as much as 75 acres, while major plants have requirements ranging from 100 to 1000 acres or more. The ideal site is a level to slightly rolling parcel of land, providing access at comparatively reasonable cost to rail and highway transportation. The "site beautiful" for larger industry is one with highway frontage and extending about ½ mile to a railroad.

Sewers and Drainage—Adequate storm and/or sanitary sewers and drainage facilities which are available or could be made available in a reasonable length of time, are highly essential. For example, a major industry, with whom we were dealing recently for the construction of a large plant to employ somewhere around 2000 persons, had as one of its major requirements the availability or the possibility for the extension to the plant within a reasonably short time of a 15-inch sanitary sewer. In the formulation of any plans for the improvement or extension of sewer lines and disposal plants, as in the case of water systems, some thought should be given to having or planning for a capacity sufficient to accommodate such extensions as might be made to take care of future growth within the community and in the environs beyond its perimeter.

Highways and Streets—Access to and from a potential plant site by good streets and highways to accommodate the automobiles of employees and other vehicles which may serve the industry is becoming more and more important, and the selection of potential sites within a community and in the environs surrounding its perimeter for immediate or future industrial development, along with topography and utility services, should also take into consideration present and future highways and streets, and the providing for of a suitable area of land between such thoroughfares and the railroad.

Power and Gas—It is a rare case today when any difficulty is encountered in making arrangements

Portions of a paper presented by Mr. Holtmann at the 42nd Annual Road School, Purdue University.

Snug right-of-way just routine condition for compact maneuverable Cleveland®

Dodging utility poles, trees and other obstructions, the compact, husky Cleveland "110" cuts utility trenches efficiently in narrow clearances like this. Its full-crawler mounting and low ground bearing pressure are real public relations assets because they minimize damage to lawns, sidewalks and driveways . . . permit efficient digging in soft muddy ground and rugged terrain too. Fast, safe trailer portability, coupled with full-crawler on-the-job maneuverability and a wider range of usable digging speed combinations make Clevelands fast *to* the job and fast *on* the job. You dig more trench . . . in more places . . . at less cost . . . with dependable Clevelands, first choice for utilities trenching for more than 30 years. Talk it over with your local distributor.

Good Everywhere

THE CLEVELAND TRENCHER COMPANY

20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

to obtain the necessary amount of power; nowever, in any negotiations with utility companies or where municipal power plants are involved, it is well to give thought to potential power supply for future developments of a type which the community feels it could support and would want to attract in its march for progress. In many communities there are available or could be made available reasonably large volumes of gas, and this commodity in many instances is a contributing factor in attracting an industry requiring it for manufacture or processing. As an example, a metal manufacturer planning the construction of a 40,000 sq. ft. building on a plant site of 6 to 8 acres, with an employment of 50 to 75 persons, set as its requirements a 100 KVA single phase electric line and 2500 to 5000 cubic feet of gas per hour. A major manufacturer requiring 200 acres of land for the construction of a plant to employ 2500 or more persons set as its requirements a power load of 10,000 KVA connected, 2,000,000 cubic feet of natural gas per day, along with 1,000 gallons of water per minute. Another major industry seeking 200 acres of land for the establishment of a plant to employ from 6,000 to 7,500 persons set as its requirements 1.25 million gallons of water per day, 700,000 cubic feet of high pressure natural gas per day, and sewage disposal facilities to be able to take care of the volume of liquid waste which would result from a plant employing as many as 7,500 persons.

Of course, there is also of vital interest to an industry the situation pertaining to labor, taxes, populations, land prices and other items with which I will not deal in detail.

It is highly beneficial for communities, in advance of dealing with any specific potential industrial development, to give consideration to what it might be willing to do in the way of extending water lines, sewer lines and other utilities to a potential industrial site, both inside and outside the present city limits, so that a definite answer could be given within a short time as to whether or not the community would be in a position to make available the necessary utilities and facilities; and, if so, at what cost and in what manner.

• • •

Safety on the New York Thruway

The New York Thruway Authority has conducted a continuous campaign of driver education and through these efforts and because of the "built-in" safety features of the highway itself, a fine safety record was established in 1955. There were 24 fatal accidents and 26 deaths in 918,501,982 vehicle miles. This represented a fatality rate of 2.83 deaths per 100,000,000 vehicle miles of travel and a fatal accident rate of 2.61. This information is from the Sixth Annual Report by the New York State Thruway Authority.

• • •

Degrees Granted By University of Illinois

One of the major civil engineering facilities in the nation, the University of Illinois is especially well known at the graduate level. In 1955 it awarded 2.3 percent of the degrees in civil engineering for the United States, 9.1 percent of the MS degrees, and 22.3 percent of the PhD's. The instructional staff numbers some 30 full-time members, and the research group about 25. Special interests include studies of concrete and steel structures, bridges, highway slabs, soil mechanics and foundations, and railways.

TASSCO SPECIALIZES IN SIGNS

These are Tassco signs . . . modern, legible, very durable. Thousands more like them, in all categories, mark many of our most modern and best planned highways roads and streets.

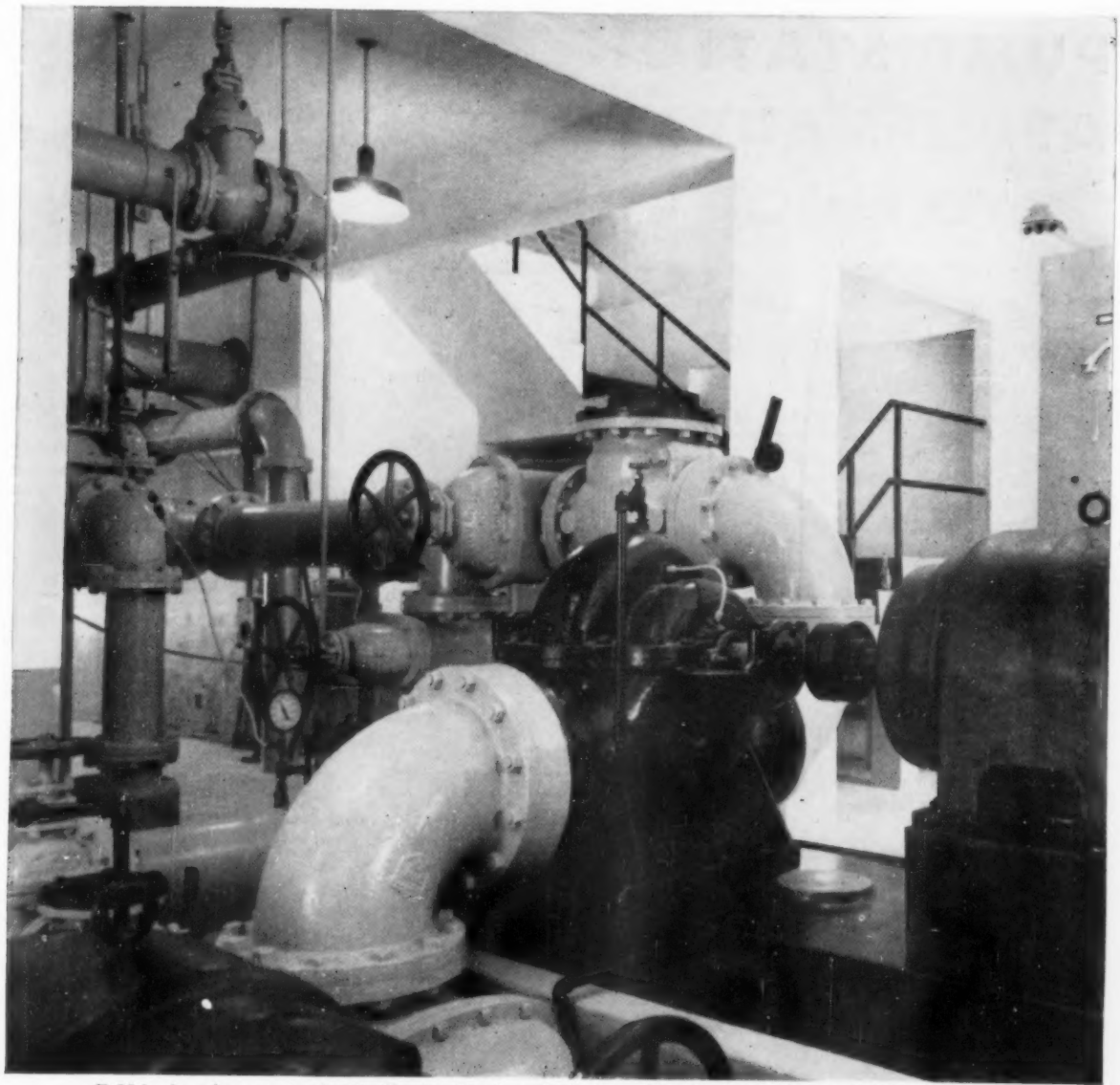
Tassco signs have one common denominator: In design, construction and finish, they cannot be surpassed by any other signs in comparable price classes.

YOU'LL FIND THE TASSCO CATALOG A TREMENDOUS HELP IN PLANNING SIGN MODERNIZATION OR INSTALLATION. WRITE FOR YOUR COPY.

The Sign of TASSCO Traffic Safety

TRAFFIC and STREET SIGN COMPANY

84 FOUNDRY STREET • NEWARK 5, N. J.



F-M backwash pump in the St. Charles filtration plant. Consulting Engineers: Barnard & Burk, Baton Rouge, La.

Rain barrel retired

A short four years ago, one district of the Louisiana Parish of St. Charles was taking its drinking water from cisterns. Now St. Charles has a million-dollar filtration plant with nine Fairbanks-Morse pumps on duty to serve the 1800 customers so far connected.

In every size community—large or small—there are Fairbanks-Morse pumps on the vital arteries of water supply and sewage disposal.

If your municipal system is straining under the load of a growing population, Fairbanks-Morse will welcome the opportunity to draw on this wealth of experience and work with your consulting engineer to recommend an efficient expansion of your facilities. Fairbanks, Morse & Co., Dept. PW-9, 600 So. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE
a name worth remembering when you want the BEST

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

PUMP STATION APPLIES AUTOMATION TO FLOOD CONTROL

JAMES JOSEPH

THE PROBLEM was to design a pump station capable of lifting storm waters over a 16-ft. high levee, yet a station which eight months out of the year will stand virtually inoperative. An answer is found in the design of the Seaside pump station in Long Beach, first of a projected 5 similar installations designed by Los Angeles County Flood Control District engineers to operate unattended, save for once-a-day inspection. LACFCD engineers term it "the closest thing to water handling automation." The primary job of the station is to lift storm waters from a large residential area, in south Long Beach, boost them over a 16-ft. levee, and discharge them into the Los Angeles River Flood Control Channel for gravity-flow to the Pacific.

Seaside, approved by a 1952 bond issue, is the first station to be built by the flood control group. Like those to follow, it will be a "lock and key" operation, its three major turbine pumps, auxiliary diesel and valves automatically actuated. The pump house is of concrete slab construction, 80 x 24 ft. and 25 ft. high with the structure set on 173 piles driven to 20-ton bearings. For maintenance, the station is served by an overhead 5-ton crane.

Ten times monthly the station's single, 275-hp Buda diesel will test-run itself, monitored by custom built controls, with the operation recorded on a Bristol 30-day chart. Just as automatic are the installation's three deep-well turbine pumps, working on a 25-ft. head and rated at 33,000 gpm. Floats in storm water sumps trigger Mercoid switches, powering pumps and also the diesel.

A fourth and smaller pump, with 1200 gpm capacity, works against a 34-ft. head; its primary function is the draining of the station's deepest sump area, some 37 ft. below the pump house floor.

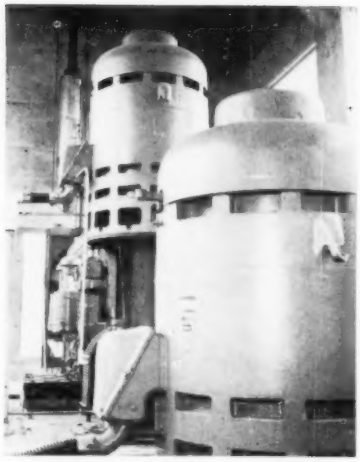
Storm waters are collected by under-street catch basins with curb inlets, and carried by storm sewers to the 78-inch inlet to the pump station. The station has two operating levels: (1) the pumphouse proper, its operational floor, electric pump motors and diesel; (2) an underfloor concrete sump with a maximum depth of 37-ft.

Storm waters entering the 78-inch inlet are passed through a trash barrier of closely-placed 2 x 12-inch redwood baffles and thence to the underfloor sump. Working the sump are the three primary pumps, all of them Cascade. A Dresser-coupled take-off from each pump suction line feeds to 36-inch reinforced concrete pipe discharge lines. The three concrete conduits exit from the pump house and climb 45 ft. to the top of the levee at the plus-16-ft. level. The smaller sump-drainage unit has an 8-inch discharge, also to the river.

The Buda diesel is strategic to the station's automation, and for good reason. Logically, the station's greatest need comes during and immediately following severe storms. Yet this is precisely the time when power outages are most likely. Thus, the Buda is coupled to one of the 33,000 gpm turbine pumps. Custom built controls assure that the engine will start up when sump levels rise and power fails.

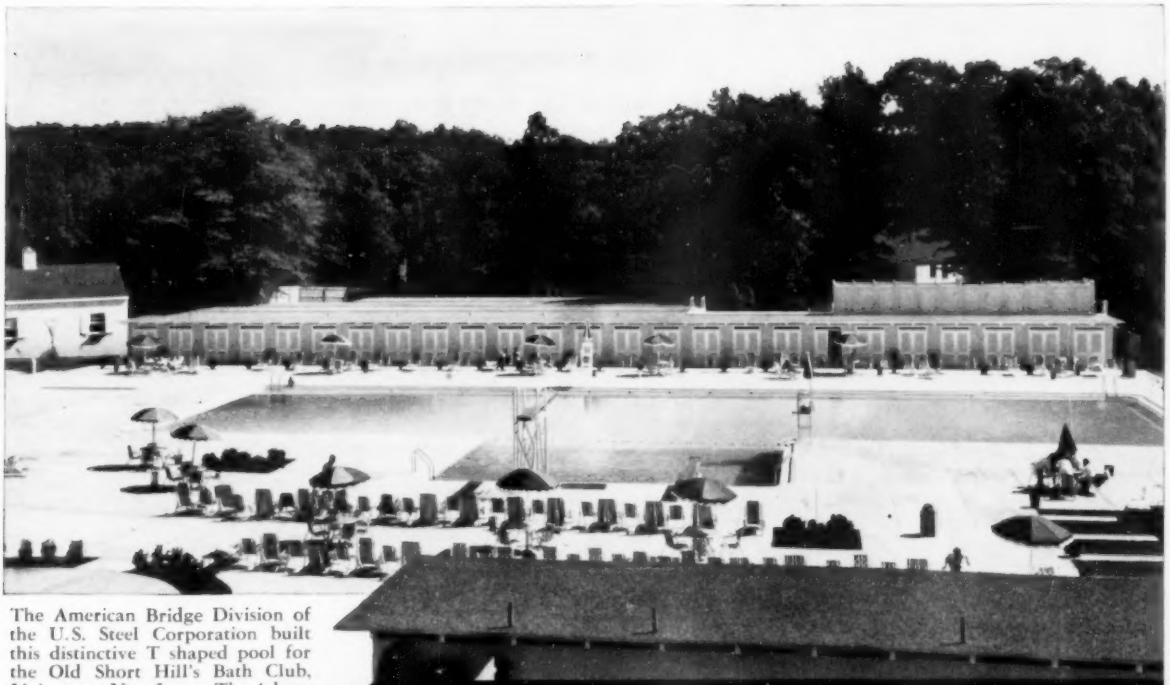
The Buda is a Model 8-DC-2505, four-cycle engine rated 275 hp at a maximum 1050 rpm; and it can idle under no load at from 450 to 500 rpm. Ability to idle at low rpm is important. First, because the diesel is coupled to its pump by a centrifugal clutch. The clutch is the spring-controlled type, capable of transmitting the engine's full 275 hp at 1050 rpm; but the clutch does not engage until engine speed builds up to between 650 and 700 rpm. Thus, for the 10-times a month test runs, the engine operates, as it must, independently. The reason is noteworthy. During most test-runs the sumps will be empty or very nearly so for the station operates only during storm water runoffs; and in California, generally, rains come only during winter. Engine or pump burn-out might result should the pump work in a dry sump. So, for tests and during low-sump conditions, the engine test-runs on idle, disconnected from the turbine pump.

This important stipulation taxed the design of the controls and made



● PUMP DRIVES on the operational floor. Unit in background can be driven by standby diesel if power should fail.

● OUTLETS to Los Angeles Flood Control Channel are at the plus 16-ft. level.



The American Bridge Division of the U.S. Steel Corporation built this distinctive T shaped pool for the Old Short Hill's Bath Club, Livingston, New Jersey. The Adams Double SPF-238 Poro-Stone Filter shown below, recirculates the 348,000 gallons of pool water every six hours — a rate of approximately 2 gallons per minute per square foot of filter area.

Another Modern Pool with ADAMS *SPF* FILTERS

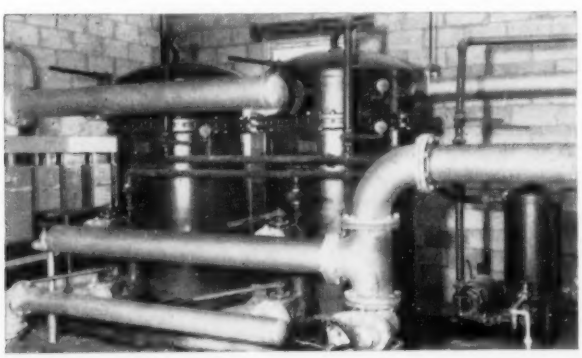
Yes, here's another distinctive pool with the popular Adams Poro-Stone filters. And, there are some good reasons why more and more public pools are insisting on Adams.

First, the exclusive ADAMS HI-FLOW backwash design gives you simple and easy cleaning . . . no messy disassembly . . . no scrubbing of filter elements.

The high air dome and unrestricted backwash outlet provide complete purging of the filter tubes with high velocity water.

Second, rugged 4¼" O. D. PORO-STONE elements with nearly 40% open area are unaffected by corrosion. The first Adams swimming pool filter — in use since 1938 — was the first Poro-Stone Swimming Pool Filter installed in this country.

There are numerous other reasons why it pays to *specify* and *buy* Adams SPF filters. Get all the facts by writing for your copy of Bulletin 625. Use the handy coupon below.



R. P. ADAMS COMPANY, INC. S-56
228 EAST PARK DRIVE, BUFFALO 17, N. Y.

Please send me by return mail your new Bulletin 625.

Name ..... Title .....

Business .....

Street .....

City ..... State .....

Size of pool is ..... gallons.

R. P. ADAMS CO., INC., 228 East Park Drive, Buffalo 17, N. Y.

Use Northern Gravel for Rapid Sand Filter

The new Northeast Station in the City of Detroit, which is scheduled for completion in 1956, is one of the major projects included in the water department's expansion program. The Northern Gravel Company furnished 120 carloads of filtering materials for the 48 rapid sand filters incorporated in this plant.

Filter Sand Specifications

are carefully laid out. The Effective Sizes and Uniformity Coefficients used by Consulting Engineers and also recommended by the American Water Works Association are the result of long years of research and experience.

The Northern Gravel Company is equipped to give you prompt shipment whether it be one bag or many carloads, exact to specifications. Filter sand can be furnished with any effective size between 0.35 MM and 1.20 MM.

Chemical Quality

of the filter sand is also important. It must be hard, not smooth, and free of soluble particles. This requires perfect washing and grading facilities. We have every modern device for washing, drying, screening and testing.

Filter Gravel

supporting the Filter Sand Bed must be, in turn, properly graded to sizes calculated to support the Filter Sand, and be relatively hard, round and resistant to solution.

Northern Gravel has no equal in facilities and our reserves of both sand and gravel are inexhaustible. Northern Gravel Company has been in business over 40 years. We guarantee uniformity of products and our records enable us to duplicate your requirements on short notice. Our location is central and we have commodity rates in every direction.

Northern Gravel Company

Muscatine, Iowa

Box 307 Ph.: Amherst 3-2711

them doubly crucial. Normally, during low sump levels, the engine test-runs at between 450 and 475 rpm, idling perhaps as high as 525 rpm, but no higher. Only when the engine is automatically cut-in, as when there is power failure plus high sump level, does the engine increase to full speed of 1050 rpm. As the 650-700 rpm point is reached, the centrifugal clutch throws in, tying engine to its pump.

Five float-switch wells and their associated but independent Mercoid switches, trigger "power on" circuits for the four pumps and diesel engine. When the diesel is operating, its pump's electric motor is automatically "blocked-out" and shut down.

The Buda auxiliary stand-by engine is installed with an electrical generator and starting motor, both operated by 32 volts dc. Start-up power comes from four 8-volt Clarite batteries, with minimum capacity of 200 ampere hours at a 20-minute rate. Batteries are tied to a Lester trickle charger, capable of fully charging them at a 24-hour rate, then switching to trickle when full charge has been reached.

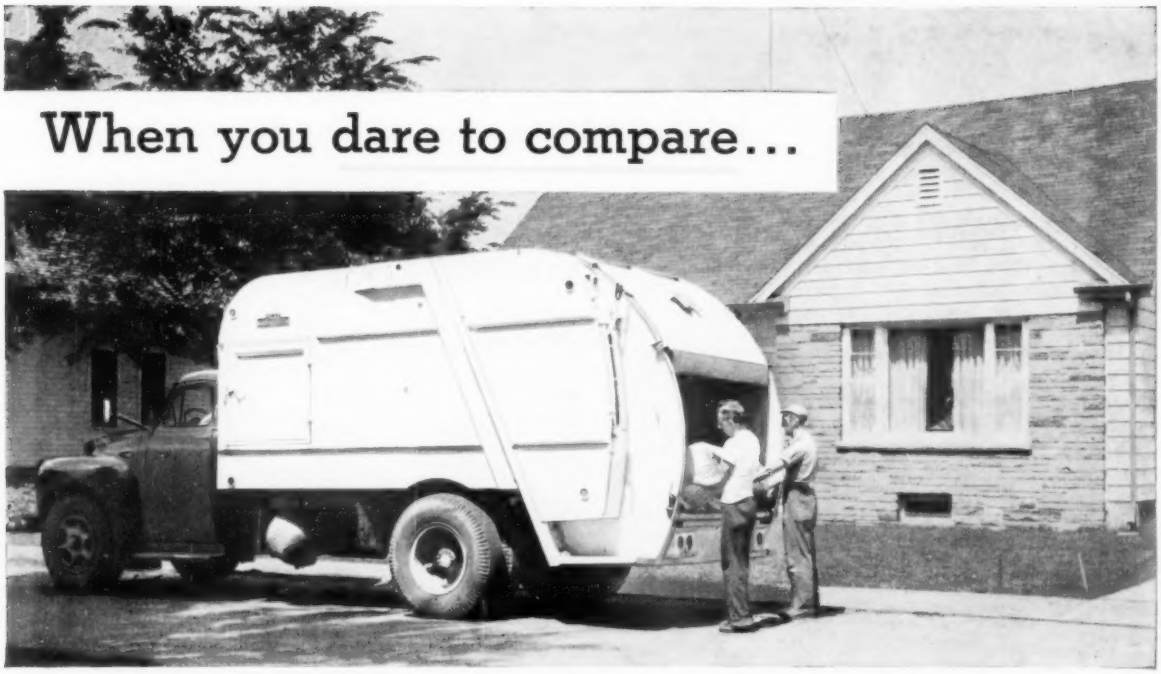
The 1000-gallon diesel fuel tank, its exterior tar-coated, is housed underground along the pump station's east side. Feed and return lines are $\frac{5}{8}$-inch copper. Along the south wall is an automatic shutter, its blades operated by the engine radiator. Normally shutters remain closed, opening only at engine start-up, and then by radiator air pressure. A rectangular transition duct connects radiator and shutter. Immersion heaters maintain lube oil and jacket water at operational temperatures.

The three Cascade deep-well turbine pumps are identical, save for No. 1 pump which is tied by special gearing to the auxiliary diesel. In general, pumps are the vertical shaft, mixed flow, bottom suction types, rated 33,000 gpm and directly connected to General Electric 300-hp induction motors. The smaller 1200 gpm sump-drain pump is directly coupled to a 15-hp GE motor.

Motors for primary pumps are equipped with four 1000-watt, 240-volt electric strip heaters. The smaller pump has two 150-watt heaters. The combination gear drive on Pump No. 1 is a Philadelphia Gear Works type SBVX.

The automatic engine controls have five functions: (1) start up the engine in times of power failure and high-sump level; (2) indicate failure of engine to start by automatic controller; (3) warn of high

When you dare to compare...



The choice is HEIL Colectomatic

Get all the facts and then decide.

That's the way to buy any municipal equipment. When you are considering refuse collection units, put a Heil Colectomatic to work against any others and here's what you'll discover.

YOU WILL PICK UP BIGGER LOADS . . . and here's why. The packing plate in a Colectomatic is located high in the hopper for better leverage. It exerts a stronger packing action through horizontal thrust, compacts more material into the body. And bigger loads mean fewer trips, better service, lower costs.

YOU WILL PICK UP MORE LOADS . . . because the loading cycle is fast, safe and simple. A touch of a lever starts the cycle. Twin hydraulic cylinders close the safety door and raise the hopper. These same hydraulic rams power the packer blade which sweeps the load out of the hopper and compresses it into the body. In just 23 short seconds you're ready for another load.

There is simply no substitute for performance that delivers the most refuse hauled per working day. But a Heil Colectomatic offers still more advantages: greater employee safety . . . freedom from jamming . . . maneuverability on the route . . . low upkeep and simple adjustments.

Why not get the facts by comparing a Heil Colectomatic to others the next time you're considering better refuse collection for your community. Your Heil distributor will be glad to demonstrate.

HERE ARE STILL MORE COLECTOMATIC ADVANTAGES

- **Quiet Operation**
  No clanking chains, minimum truck engine acceleration noise during loading.
- **Easy Loading**
  Low, wide sill permits two men to load side by side.
- **Simplified Service**
  All lube points can be reached through panel door on each side of body.
- **Fast Dumping**
  Flat floor and obstruction-free tapered body provide quick, clean dumps. Load distribution on axles provides good stability while dumping.
- **Safety**
  Loading-packing mechanism is completely enclosed and a safety door protects personnel from flying debris.
- **Compact body**
  You can maneuver easily in tight alleys and other narrow, restricted areas.

NEW! 13-YD HEIL COLECTOMATIC

Meet us in Spaces 20 through 23 at the A.P.W.A. Convention in Fort Worth, Texas, September 23-26. Learn all about the new 13-yd Colectomatic!

THE HEIL CO.

Dept. 4496, 3044 W. Montana St., Milwaukee 1, Wisconsin
Factories: Milwaukee, Wis., Hillside, N. J., Lancaster, Pa.

Heil Sales Offices: New York; Union, N. J.; Lancaster, Pa.; Atlanta; Cleveland; Milwaukee; Chicago; Kansas City; Denver; Dallas; Los Angeles; Seattle

jacket-water temperature (in excess of 185° F.); (4) warn of low lube oil pressure (if engine lube pressure drops below the safe limit for a period of 15-seconds); (5) warn of engine overspeed, and shut diesel down (if speed exceeds 1200 rpm).

Ten times monthly the unit automatically starts up the engine, runs it for a preset time (anywhere from 1 to 30 minutes, dependent upon setting). During tests the engine idles at a maximum 525 rpm. The run is recorded and monitored by the Bristol chart which, in turn, is linked to an electric program clock on the panel. Should something go wrong, warning lights flash, an alarm sounds, and the engine is automatically shut down.

The control unit, actuated by a combination of power failure, float switch or test run, begins the cranking cycle (five positive cranks, four positive rests). Cranks and rests are adjustable from 5 to 60-seconds duration each. At the moment of cycling, a solenoid triggers to operate the sight feed lubricator on No. 1 pump. Another energizes the engine governor, either for full or idle. Should the engine be on test during a storm, and should a power outage, combined with rising sump level, call for immediate emergency full operation, this latter condition takes precedence, automatically raising speed from test-run idle to full.

The project is a joint venture of Stolte, Inc., and Morrison-Knudsen Co., Inc. Project superintendent is Joseph Kubich. Harry Davis is area supervisor for the Los Angeles County Flood Control District, which will operate the station. James R. Bole was consulting engineer.

Standards For Interstate Highway System Approved

THE COMMISSIONER of Public Roads, acting for the Secretary of Commerce, has approved the new geometric design standards for the National System of Interstate and Defense Highways. These standards were adopted by the Committee on Administration of the AASHO. Following are parts of these standards:

Control of Access. On all sections of the Interstate System, access shall be controlled by acquiring access rights outright prior to construction or by the construction of frontage roads, or both. Control of access is required for all sections of the Interstate System. Under all of the following conditions, intersections at grade may be permitted in sparsely settled rural areas which are a sufficient distance from municipalities or other traffic-generating areas to be outside their influence, and where no appreciable hazard is created thereby.

(a) The Interstate highway is a two-lane highway having a DHV (1975) of less than 500.

(b) Each intersection at grade is with a public road or private driveway with little potential for traffic increase and on which the current ADT does not exceed 50 vehicles.

(c) Such intersections do not exceed two per side of the Interstate highway per mile.

(d) Sufficient additional corner right of way at each intersection at grade is acquired to insure that access connections on the crossroad are sufficiently removed to minimize

(Please turn to page 162)

FREE TRIAL OFFER

on all the new

Fisher

"Electronic Witch"
M-SCOPE
PIPE FINDER

Try Fisher's new "Electronic Witch" M-SCOPE for 10 days

— FREE! —

Test this new pipe and cable finder under YOUR actual working conditions. This advanced instrument outperforms any pipe locator on the market regardless of price or design!

Simply state on your company's purchase order that you want the Fisher 10 day FREE TRIAL OFFER. Trial period begins the day the instrument arrives. Your only expense is the nominal shipping charges.

ONLY $172.50
with indestructible Fiberglas cabinets

100% ACCEPTANCE
Last year, *a full 100%* of those who took the "Electronic Witch" on trial purchased the instrument!

Free 1956 Catalog

FISHER
Research Laboratory, Inc.
Dept. PW-1, Palo Alto, Calif.

Geophysical Instruments Since 1932

SAVES $ LOTS OF $

$ . . . on pipe runs under streets, highways, pavement, gardens, etc.

REG. U. S. PAT. OFF.

HYDRAUGER*

HY-25C

OPEN HOLE

AVOID TIME WASTE

Hydrauger is a modern, time-saving way to install underground pipe . . . avoids trenching, backfilling, pavement cutting, etc.

2" to 24" BITS and REAMERS

HYDRAUGER CORP. Ltd.
681 Market Street
San Francisco, California

*Earth Boring Tool

ASK FOR BOOKLET . . . NO OBLIGATION

Rock Salt . . . and Today's Roads

by **INTERNATIONAL SALT COMPANY, INC.**—America's largest producer of salt

3-Year Survey Shows Why Rock Salt Is "Best" for Ice, Snow Removal

Early this year, the Civic Affairs Committee of The Engineering Society of Detroit completed an exhaustive study—"The Use of Salt for De-Icing Streets." Over three years of intensive work by 14 outstanding engineers went into this study—which covered representative cities across the country. Their final report is now considered to be the most authoritative ever published on the subject.

Here are some of the highlights of this important report:

Public safety—and economics. According to studies made in Detroit, severe winter storms in this city could produce staggering financial losses. Employee lateness would cost $55 million a year . . . retail sales would drop $26 millior a year . . . trucking losses would be $7 million annually . . . and this does *not* take into account huge losses from accidents, damage, decreased factory output, etc.

However, the use of rock salt in Detroit for immediate removal of ice and snow *prevents* these losses from occurring. And at very little expense, compared to the economic benefits to the community. For these reasons, The Civic Affairs Committee concludes: ". . . use of rock salt is by far the best procedure, and is in the best public interest. . . . It is a 'modern' program geared to the problem of keeping an urban community operating in spite of adverse winter weather."

Effect of rock salt on cars. Studies were made in 12 different states in order to determine corrosive effects of rock salt on car bodies, bumpers, fender welts, etc. (The three major automotive manufacturers were represented on the Committee in this work.) According to the evidence collected, The Civic Affairs Committee states, "The enamels and lacquers used on autos today are relatively unaffected by salt used on the street to melt ice and snow. Only when the finish is broken in some manner, allowing the brine solution to reach the underlying steel, will corrosion start."

Corrosion inhibitors. The Civic Affairs Committee also investigated so-called corrosion inhibitors. Their findings indicated: ". . . the use of inhibitors in salt is of doubtful value in protecting the exterior appearance of autos." It was also reported that "inhibitors are unable to prevent corrosion of susceptible parts of autos."

Effect of rock salt on utilities and other structures. In this study, the Detroit Edison Co. and the Michigan Bell Telephone Co. presented evidence to show that the economic benefits of using rock salt far outweighed any effects it may have on their equipment. "In general . . . the problems of the electric utility are not measurably increased by use of salt in de-icing streets." Also, the effect of salt on telephone utilities "appears to be of a low order of magnitude and is readily handled by normal maintenance procedures."

As far as street or highway surfacing is concerned, these general observations were made: Rock salt does not harm black top (bituminous and asphalt), natural stone, and air-entrained cement surfaces.

FREE COPY of the complete Civic Affairs Committee report—"The Use of Salt for De-Icing Streets." A *must* for every official concerned with highway safety, traffic, maintenance—and practical economics. Fully documented, with graphs, charts, references. For your copy, write International Salt Co., Scranton 2, Pa.

STERLING SALT FOR ICE AND SNOW CONTROL

When you set up this winter's program for ice and snow control, be sure to check with International Salt Company—makers of famous Sterling Rock Salt. One of International's skilled and experienced "Salt Specialists" will help you set up an effective, low-cost program for *your* roads and streets. He'll show you actual examples of how Sterling Rock Salt has worked to speed removal of snow and ice. And he'll give you complete details on ordering, storing, and applying this quality salt product. Just contact your nearest International sales office.

JUST 7 MINUTES after Sterling Rock Salt was applied—this U.S. Highway is clear and open! Traffic is moving safely despite the snowfall. On this highway—as on many others—tests have shown that just one truckload of Sterling Rock Salt covers as long a stretch of road as five truckloads of abrasives. And with this rock salt, spring cleanup expense is eliminated.

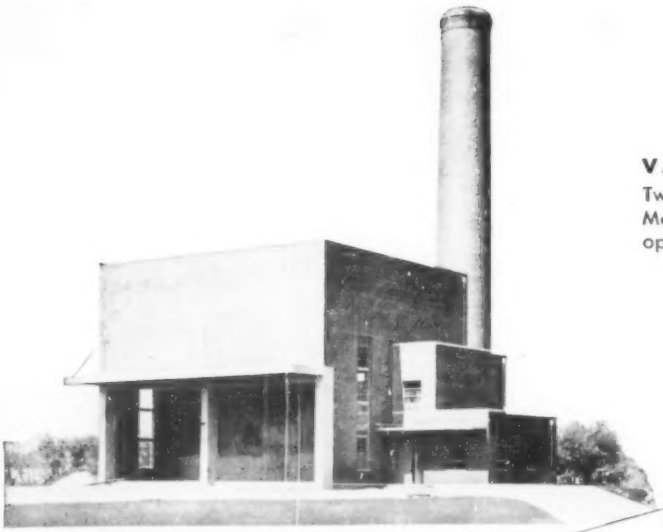
IMPORTANT NEWS: Now you can store your rock salt outdoors—and still have it free-flowing when winter storms hit! A newly developed chemical agent, Sterling *Storite*, actually prevents rock salt from caking. It eliminates the need for costly structures to protect salt from weather . . . permits economical early ordering. Amazing new *Storite* is low in cost, easy to apply. Be sure to specify Sterling *Storite* with your order of Sterling Rock Salt. It's available now—shipped in 50-lb. drums.

Sales Offices: Atlanta, Ga.; Chicago, Ill., New Orleans, La.; Baltimore, Md.; Boston, Mass.; Detroit, Mich.; St. Louis, Mo.; Newark, N. J.; Buffalo, N. Y.; New York, N. Y.; Cincinnati, O.; Philadelphia, Pa.; Cleveland, O.; Pittsburgh, Pa.; and Richmond, Va

FOR ROADS, INDUSTRY, FARM, AND HOME—

STERLING SALT

PRODUCT OF INTERNATIONAL SALT CO., INC.

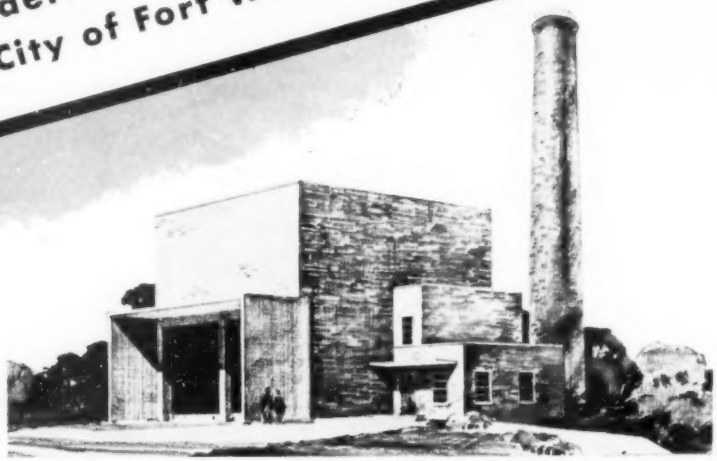


Wyatt C. Hedrick, Architect-Engineer
Cain & Cain, General Contractors

VALLEY VIEW INCINERATOR
Two 13 foot (O.D.) Morse Boulger Circular Mechanically Stoked Furnaces placed in operation in October 1953.

OPEN FOR INSPECTION!

Two Modern Incineration Plants at the City of Fort Worth, Texas



Wyatt C. Hedrick, Architect-Engineer
Wilder Construction Co., General Contractors

BERRY STREET INCINERATOR
Two 13 foot (O.D.) Morse Boulger Circular Mechanically Stoked Furnaces now being completed.

Plan a Visit

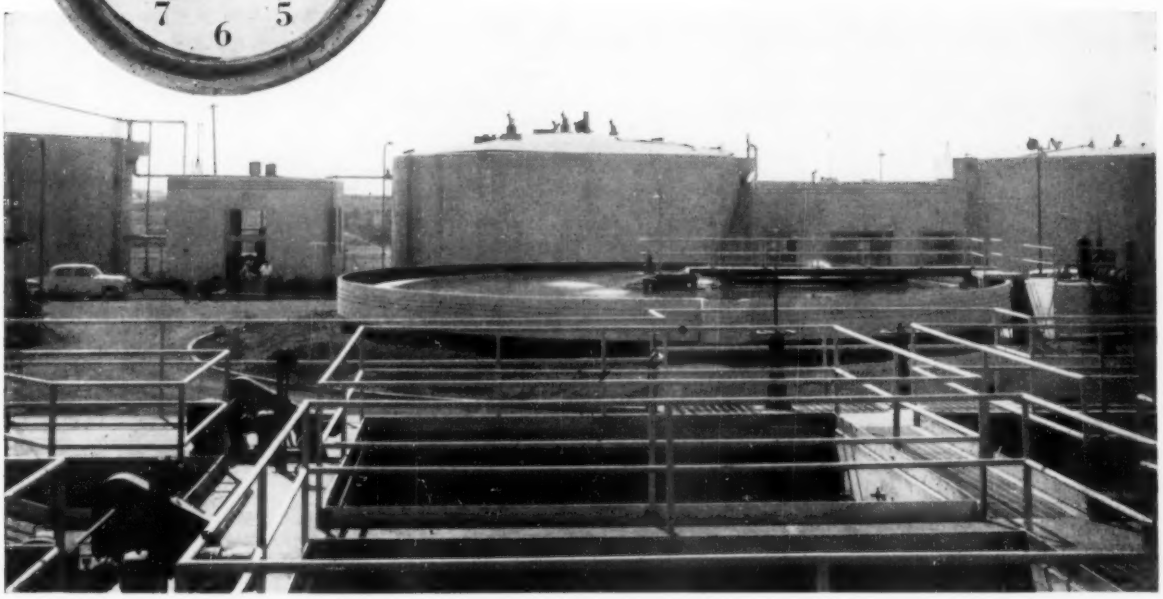
during the APWA Congress—Sept. 23-26

MORSE BOULGER DESTRUCTOR CO.

DEPARTMENT B, 80 FIFTH AVENUE, NEW YORK 11, N.Y.

SLUDGE PUMP STOPPAGES ELIMINATED AT SAN LEANDRO

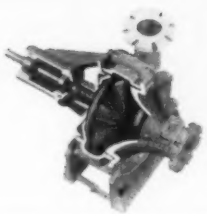
by **WEMCO** the sewage pump that never clogs



The installation of WEMCO Pumps at the sewage treatment plant in San Leandro, California, has completely eliminated down time on sludge transfer service. Previous down time losses amounted to 4 to 6 hours daily. These WEMCO Torque Flow Solids Pumps replaced plunger type pumps that had been having several stoppages per day.

San Leandro's sewage treatment plant has a special problem created by cannery wastes. During the last canning season, the WEMCO Pumps proved themselves by handling the increased sludge load without once clogging.

What had been a troublesome pumping job requiring extra maintenance labor and operators' standby time has now become a simple, trouble-free, almost forgotten routine.



Because the Wemco Torque-Flow Solids Pump can solve pressing and aggravating problems in your city's sewage handling and treatment, you need the full facts. Wemco's simple "never clog" principle is fully explained in available literature. Write today for your copy.

WEMCO®
WESTERN MACHINERY COMPANY

760-M Folsom Street • San Francisco 7, California
Representatives in principal cities of the United States and Canada and in major countries throughout the world.

interference with the highway.

(e) The right to eliminate, terminate, or reroute each such public road or private driveway is vested in the appropriate public authority.

Where a grade separation is called for under these standards and extraordinary conditions exist under which a grade separation would not be in the public interest, an intersection at grade may be permitted.

Railroad Crossings. Railroad grade crossings shall be eliminated for all through-traffic lanes.

Intersections. All at-grade intersections of public highways and private driveways shall be eliminated except as otherwise provided under *Control of Access.*

Design Speed. The design speed of all highways on the system shall be at least 70, 60 and 50 miles per hour for flat, rolling, and mountainous topography, respectively, and depending upon the nature of terrain and development. The design speed in urban areas should be at least 50 miles per hour.

Gradients. For design speeds of 70, 60, and 50 miles per hour, gradients generally shall be not steeper than three, four, and five percent, respectively. Gradients two percent steeper may be provided in rugged terrain.

Width of Lanes. Traffic lanes shall not be less than 12 feet wide.

Medians. Medians, in rural areas in flat and rolling topography, shall be at least 36 feet wide. Narrower medians may be provided in urban areas of high right-of-way cost, on long and costly bridges, and in rugged mountainous terrain, but no median shall be less than four feet wide. Where continuous barrier curbs are used on narrow medians, such curbs shall be offset at least one foot from the edge of the through traffic lane. Where vertical elements more than 12 inches high, other than abutments, piers, or walls, are located in a median, there shall be a lateral clearance of at least 3½ feet from the edge of through traffic lane to the face of such element.

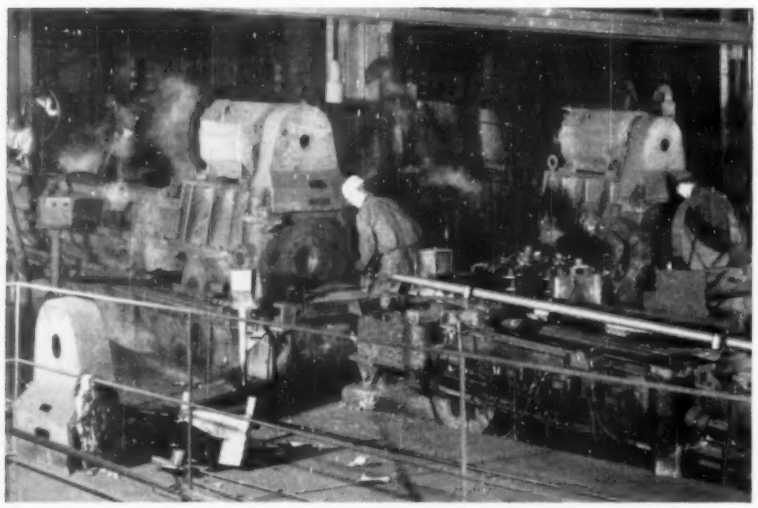
Shoulders. Shoulders usable by all classes of vehicles in all weather shall be provided on the right of traffic. The usable width of shoulder shall be not less than 10 feet. In mountainous terrain involving high cost for additional width, the usable width of shoulder may be less, but at least six feet. Usable width of shoulder is measured from edge of through-traffic lane to intersection of shoulder and fill or ditch slope, except where such slope is steeper than 4:1 where it is measured to beginning of rounding.

Slopes. Side slopes should be 4:1 or flatter where feasible and not steeper than 2:1 except in rock excavation or other special conditions.

Right-of-way. In rural areas right-of-way widths should be not less than the following, plus additional widths needed for heavy cuts and fills: 2-lane without frontage roads 150 ft.; with frontage roads 250 ft.; 4-lane divided 150-250 ft.; 6-lane divided 175-275 ft.; 8-lane divided 200-300 ft.

In urban areas right-of-way width shall be not less than that required for the necessary cross section elements.

Bridges and Other Structures. The clear height of structures shall be not less than 14 feet over the entire roadway width, including the usable width of shoulders. Allowance should be made for any contemplated resurfacing. The width of all bridges shall equal the full roadway width on the approaches, including the usable width of shoulders.



We Make It *BETTER*
YOU LAY IT CHEAPER

It's hard to beat QUALITY plus ECONOMY. McWane's modern 2″ and 2¼″ cast iron pipe in 20-foot lengths is the best Small Diameter pipe we have ever produced. Cast centrifugally, it has straight barrel, even wall thickness, sound metal section, high strength. It costs no more than old-fashioned Small Diameter pipe, but you save time and money in construction costs because you have ⅓ to ½ less joints to make. Furnished bell-and-spigot or mechanical joint for IMMEDIATE SHIPMENT. Write or phone

McWANE CAST IRON PIPE COMPANY
Birmingham, Alabama

Sales Offices: Chicago, Dallas, Kansas City, New York, Birmingham

McWANE 20-FOOT 2 & 2¼ INCH PIPE

ANOTHER JAY 1ST!

Now you can repair asphalt surface the new... easy... economical... 2-step JAY-WAY

1

The new Smooth-Edge Jay asphalt tamping blade tamps down asphalt patch to more uniform compaction than even a 10-ton roller can deliver.

See how *one* operator with the new Jay-way cutter slices easily through old asphalt surface. Unit cuts handily at a rate of from 5 to 9 feet per minute, depending on thickness and aggregate.

2

And as a multi-purpose tool, the Jay Tamper has no equal... wherever soil, stone or other materials require both vibration and impact to obtain maximum uniform densities

• SEWERS • TRENCHES • DITCHES
• ROAD WORK • NEW CONSTRUCTION

Yes, it's as simple as one . . . two . . . with the new Jay-way CUTTER-TAMPER Combination. And besides, all Jay units are designed, engineered and manufactured for rugged use which contractors say gives them low maintenance as well as high performance.

Ask your dealer for an on-your-job demonstration—or write

THE JAY Company

• 180 HOSACK STREET
COLUMBUS 7, OHIO

• See the new Jay-way Cutter-Tamper in action Booth No. C-8, APWA Show, Dallas, Sept. 23-26

● TRIPLE diving unit, equipped with three "Lifetime" aluminum diving boards, installed at municipal pool, Marquette, Mich.

Installing and Maintaining an Aluminum Diving Board

NORMAN R. MILLER
Vice President,
American Playground Device Co.

SHIRAS MUNICIPAL POOL is located in Presque Isle Park, in Marquette, Mich., a few hundred feet from Lake Superior. Ever since this pool was opened, it has enjoyed a heavy attendance and the diving boards and beach playground equipment receive severe and constant usage. Since ordinary diving boards did not last under this heavy usage, the City Recreation Department installed a triple diving unit consisting of three "Lifetime" type aluminum diving boards. The unit is installed on a large raft securely anchored in the deep-water portion of the pool.

The advantages of such an aluminum diving board include its ability to withstand very hard usage; its design, which eliminates torque or twisting action at the tip; and its indefinitely long life. In order to obtain these advantages in full, proper installation is necessary. Here are the things to do:

Mount the board on a level and strong frame; make sure that the fulcrum is covered solidly with a half of an inch of rubber, for its full width. The board should not rub against metal or other hard material and should ride fully on the fulcrum. Recommended fulcrum distance for ordinary usages are: for a 16-ft. board, 72 to 84 ins.; and for a 14-ft. board 60 to 76 ins. from the rear anchorage.

The use of a steel strap next to the board at the rear mounting may cause electrolysis and resulting corrosion. A thin layer of rubber between the board and the rear anchorage will prevent corrosion and will reduce noise when in use. The aluminum board is also anodized and waxed to protect against corrosion. If the pool water carries a good chlorine residual, the underside of the board will become discolored due to the reaction between the chlorine and the aluminum, but this will not affect the structure of the board.

Very little pitch is necessary on the aluminum board since it does not droop or sag. At the end of the season, the board should be removed and stored right-side up, resting on 2 x 4-inch timbers placed near either end. Discoloration should be cleaned off and the board given a coat of clear lacquer, followed by waxing when dry.

● POPULAR recreation area at the Shiras Municipal Pool in Marquette provides see-saws and swings, which are used extensively by the younger generation.

Unique method of placing concrete saves time and money at Grand Rapids sewage plant

Using a special swivel pump rig to place concrete in six 100-ft. diameter settling tanks at the Grand Rapids, Mich. sewage treatment plant saved considerable time, labor and money.

As the photo shows, concrete was pumped through a rotating conduit and deposited continuously in the forms. Each tank required 180 cu. yd. of concrete and was completed in a seven-hour day by a seven-man crew.

This demonstrates concrete's adaptability to the special conditions of any job. Placed by this or another method, concrete is the ideal material for sewage treatment plants and facilities.

Concrete is moderate in first cost. It requires little or no maintenance. It has extremely long life. The result is ***low-annual-cost*** service.

For more information on concrete construction for sewage treatment plants write for a free illustrated booklet, "*Sewage Treatment Works.*" Distribution limited to the U. S. and Canada.

PORTLAND CEMENT ASSOCIATION Dept. 9-89 33 West Grand Avenue, Chicago 10, Illinois

A national organization to improve and extend the uses of portland cement and concrete through scientific research and engineering field work

LITTLE GIANT SELF-PROPELLED "SPA" CRANE

Tops in Mobility and Economy with Single Engine Model

FEATURES *Hydraulic steering and braking power. 4 wheel drive. Turns in less than 60' circle. 360° vision cab. Independent operation, travel and steering.*

Exclusive BALL BEARING TURNTABLE offers:

Cuts maintenance costs, down time. Eliminates hook rollers. Gives greater stability. Lessens operator fatigue. Lower center of gravity. Swings as easily on slopes as level ground.

COMPLETE LINE *6 to 12 ton cranes. Truck mounted or crawler. Wide track pads give lowest PSI. All attachments available, including sensational labor saving "post Driver," driving up to 400 wood or steel posts per day.*

LITTLE GIANT CRANE & SHOVEL, INC.

East 16th and Howard Drive, Des Moines 13, Iowa

The feather-touch with

DYNAMITE ACTION!

MORE EFFECTIVE THAN EVER—

MARLA AERO SPRAY PENETRATING OIL

Gives you the Advantages of:

1. **SPRAY.** Assures penetration, with pressure, to the most hard to get at objects. Shoots a stream three feet if needed.
2. **SPEED** Always ready at the touch of a button. The fastest acting non acid, non alkali penetrating oil known or money back.
3. **ECONOMICAL.** Spray container eliminates wasted surplus and time in application. Cannot leak or spill.
4. **HANDY.** Carried easily and is always ready for use. No chance for ingredients to weaken by exposure to air from a misplaced cap.
5. **VERSATILE.** Marla Spray Penetrating Oil is used to free the most corroded bolts, screws, pipe threads, bearings, bushings, pulleys, manifolds, valve guides, locks or any other stuck together metal parts.

PRICES F.O.B. St. Louis

Case of 6 12-oz. cans $9.00

Case of 12 12-oz. cans $17.40

ROTHLAN CORP. 3618 Laclede Ave., St. Louis 8, Mo.

Specialists in Fine Penetrating Oil for Over Thirty Years.

Air Pollution and Incinerator Design

The Glendale, Calif., newly completed municipal incinerator, which has a daily burning capacity of 90 tons, has several features incorporated in the design seldom used in the region before. These were adopted primarily in the interest of minimizing air pollution:

(1) Ramrod charging, in which the rubbish instead of being dumped into the top of the incinerator, is fed down a 25° slope and rammed into the ignition chamber by an 8-ft. wide plunger that compacts the load.

(2) Specially contrived grates, operated by levers, which transport the rubbish charge evenly across the grate bed making it lie in a level pile instead of a conical mound.

(3) A water scrubber to trap particulate matter escaping from the combustion chambers; otherwise such material would be emitted as fly ash.

Natural gas is available as an auxiliary fuel. By igniting and preheating the furnace to 800°F when it is first charged, the gas can be later turned off and the burning temperature maintained by controlled loading. In this way 3,000 lbs. of debris can be initially charged into the furnace before it is ignited and 700 to 800 lb. added at intervals to maintain the constant temperature required for optimum combustion during the 24-hr. period of operation.

• • •

Cost Figures on Water Taps

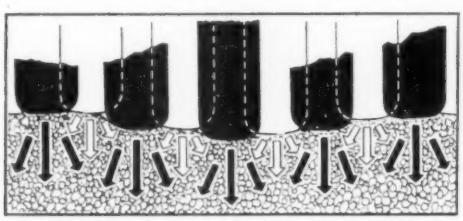
The annual report, published by the Toledo, Ohio, Division of Water, gives some cost figures on the installation of water taps. During 1955 the department made 3,248 taps in sizes from ¾ to 2-inches. The average cost of a ¾-inch tap was $75.08; 1-inch size $79.38; 1½-inch tap $195.07; and 2-inch tap $236.93. The total amount of money spent on taps was $271,351.18.

• • •

Water Consumption Sets New Records

Midland, Texas residents on June 15th, 1956, established a new record for water consumption with a total of 15,710,000 gallons used in a single day or an average of 350 gallons per capita. The average daily consumption in June of 13,475,000 gallons also set a new record. This material appeared in the Midland Monthly Report.

How oscillating wheels can save you untold street maintenance costs...



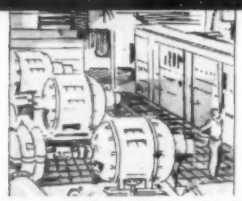
See the flow of compaction effort that the BROS Self-Propelled roller **with torque converter drive** provides for street seal coating, resurfacing and shallow lift compaction . . .

Here's how it is helping cities throughout the country make great savings in street maintenance costs:

- With full oscillation of all wheel pairs to provide uniform compaction, the BROS SP-54 helps "key" and "lock" aggregate materials tightly in the base course to prevent various pavement failures.
- Wheel oscillation of this roller also kneads the asphalt into a tight, solid surface, eliminating hairline cracks that would otherwise turn into surface breaks. Very important, too, rubber tire rolling correctly imbeds the wearing course chips *without* crushing them.
- Besides such proven advantages, the BROS SP-54 offers these time-saving performance features: a torque converter drive provides smooth, easy handling and eliminates "tipping" of chips when starting; it also lessens drive line strain.
- Full-reversing type transmission with shuttle gear permits rolling in either direction without shifting; turn arounds are thus eliminated.
- Infinite speed range from 0 to 18 mph; positive chain drive to both rear wheel pairs; 50 HP engine and smooth, hydraulic steering provide fast, proper compaction results that you can't get from any other roller. See a BROS Distributor or write us for full information and/or a demonstration. WM. BROS BOILER & MFG. CO., ROAD MACHINERY DIVISION; 1057 TENTH AVE. S. E., MINNEAPOLIS 14.

Find out, too, about the complete BROS TEAM. With the SP-54, the BROS Preparator and Roto-Mixer make the perfect combination for low cost street construction. The Preparator (in-place materials reducer) reduces native over-size materials and old blacktop to proper roadbed sizes. The Roto-Mixer stabilizes and blends the base and wearing course materials to improve load bearing values.

BROS



PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Automatic Operation Of a Scotch Filter Plant

The author, engineer of Stirlingshire & Falkirk Water Board, Scotland, believes that their Broadside filter plant, which began operation in 1952, was the most fully automatic which had been constructed to that date. It includes automatic filter washing, including air scouring and surface flushing; automatic selection of filters for washing; automatic chemical proportioning; filter flow regulation; shutting down, reopening or varying the rate of flow; with all plant operations interlinked with a comprehensive system of alarm signals. The plant was designed with a present capacity of 12.65 mgd (imperial gallons) and provision for enlarging to 21 mgd capacity. Wash water and sludge from the settling tanks flow into lagoons, from which the supernatant water is pumped back to the raw water. Noncorrodible materials are used throughout; troughs are of asbestos cement painted with bitumen. Pipes in the filter floors are of vitrified clay; nozzles of arsenical aluminum brass; chlorine is carried through pyrex glass tubing. Spun iron pipes are lined with concrete or vitreous enamel. An important feature of the plant is the method of washing the filters. The 12 filters are automatically selected for washing in the order determined by the loss of head in each. First a filter is scoured for 4 min. with compressed air; then washed for 4 min. with water passing up through the sand at the rate of 6 gpm per sq. ft. This does not expand the sand, but on breaking through, the water flows horizontally across the sand bed, carrying the dirt with it, and over a sill 4½ in. high. There are no washwater troughs, and no loss of sand and no formation of mud balls. This article describes the plant and its operation in detail.

"Automatic Operation at the Broadside Filter Plant in Scotland." By Eric W. Denholm, Eng. of the Water Board. *Jour., AWW Ass'n*, June.

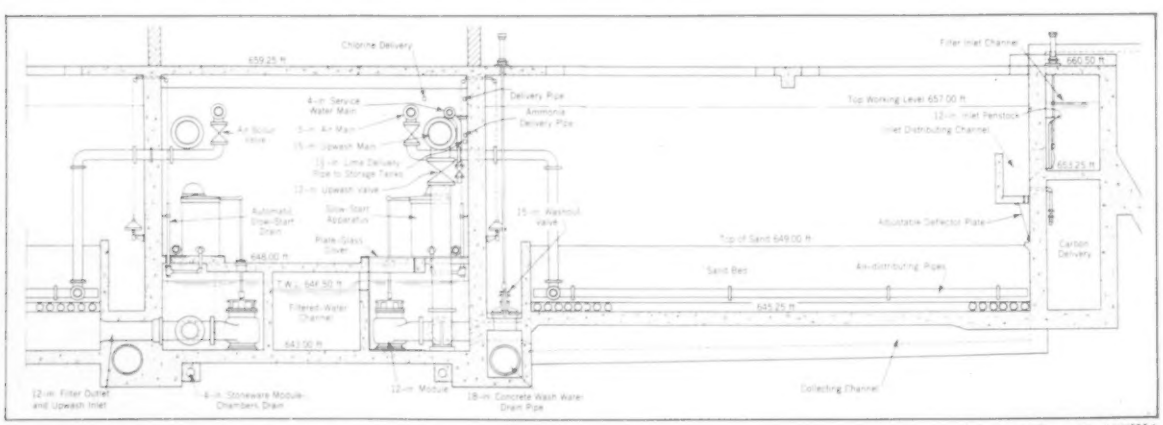
Gamma Radiation For Disinfecting Water

The study described in this article was made to learn the effect of high-level cobalt-60 gamma radiation in reducing bacteria populations in contaminated water and sewage. In the case of pure cultures of ten water-borne organisms, a dosage of 100,000 reps (Roentgen equivalent, physical) was sufficient to kill 99% or more of the organisms. The coliform organisms proved to be the most susceptible. *Strep faecalis* and *B. subtilis* were the most resistant. A dosage of 25,000 reps demonstrated very high reductions in the total populations present in naturally polluted river waters. The pH of the water over a range of 5.0—8.5 had no influence on the bactericidal action of the gamma radiation.

"Effect of High-Level Gamma Radiation on Disinfection of Water and Sewage." By Gerald M. Ridenour, Prof., and Edward H. Armbruster, Assoc. Prof., School of Pub. Health, Univ. of Michigan. *Jour., AWW Ass'n*, June.

Removal of Iron by High-Capacity Zeolite

This paper describes a study made to determine the efficiency of high-capacity zeolite to remove iron by base exchange, and to determine the effects of iron on the exchange capacity of the zeolite. The results indicated that, in ordinary plant operation, iron in excess tends to remain in the zeolite and lowers its capacity. Proper dosage of polyphosphates in the raw water will prevent retention of iron and fouling of the beds thereby. It is preferable, however, to remove the iron



Courtesy Journal AWWA

● **SECTION through filter and pipe gallery of the Broadside Filter Plant in Scotland, which has automatic operating controls.**

THE BIG RED HAND

Another Bonus Value In All Rockwell Water Meters

As *standard construction* the registers on all Rockwell meters have a large red center test hand. This red hand sweeps the entire outer circumference of the dial. Like the split-second hand on a stop watch, the slightest movement can be seen.

When testing a new or repaired meter, this large hand and big circle scale provide a much closer accuracy check than can be obtained from a conventional small test hand. Center mounting permits a better arrangement of the dial—one that's easier to read. And the large sweep dial test hand is an invaluable aid when checking for leaks on customer's premises.

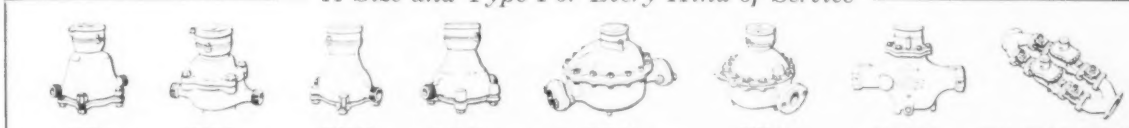
The big red hand is only one of the bigger, better values that Rockwell builds into all its water meters. It's an outward indication of *quality* construction through and through. *Write for catalogs.*

ROCKWELL MANUFACTURING COMPANY

PITTSBURGH 8, PA. Atlanta Boston Charlotte Chicago Dallas Denver Houston Los Angeles Midland, Texas. New Orleans New York N. Kansas City Philadelphia Pittsburgh San Francisco Seattle Shreveport Tulsa In Canada: Rockwell Manufacturing Company of Canada, Ltd., Toronto, Ontario

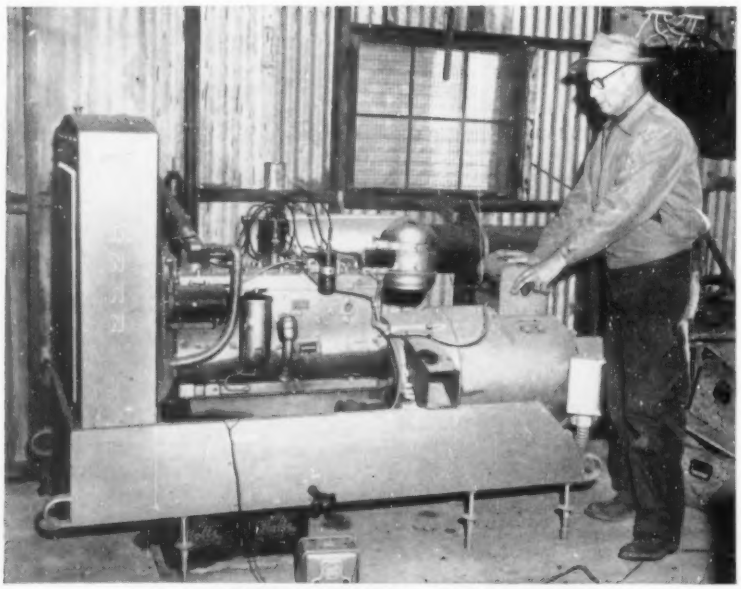
ROCKWELL WATER METERS

A Size and Type For Every Kind of Service



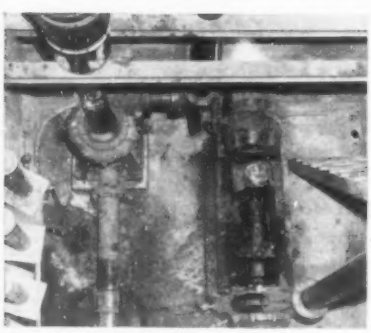
How the city of Gridley (Calif.)

GIVES SEWAGE A LIFT



...with ONAN

EMERGENCY ELECTRIC POWER



These two electrically-driven pumps lift sewage 25 feet to the out-fall line. During a power outage, electricity from the Onan Standby Plant keeps them pumping.

500 TO 50,000 WATTS

Air-cooled, gasoline-powered:
500 to 10,000 watts.
Water-cooled, gasoline-powered:
10,000 to 50,000 watts.
Air-cooled, Diesel-powered:
3,000 and 5,000 watts.

At one point in the Gridley sewage system, sewage has to be pumped up 25 feet to the out-fall line. Two electrically-driven centrifugal pumps do the job. But any interruption of utility power to these pumps would cause sewage to back up and could put the system out of operation.

To make sure this doesn't happen, Gridley has installed an Onan 35,000-watt gasoline-engine-driven electric plant in the lift station. When utility power is interrupted, the Onan plant takes over, keeps the pumps going.

Gridley has another 35KW Onan unit mounted on a heavy-duty trailer which can be quickly towed to any spot needing power. A big fire recently blacked-out a big part of Gridley and for 3 hours the Onan Electric Plant kept that part of town supplied with light and power.

Built in many models and sizes, Onan Electric Plants serve as emergency units for fire and police departments, civil defense, and other municipal services. Lightweight Onan portable plants are used by fire, street, and park departments for electricity where utility power is not available.

Write for folder and specifications

D. W. ONAN & SONS INC.

3668 UNIVERSITY AVE. S. E., MINNEAPOLIS 14, MINNESOTA

by aeration and filtration before softening.

"Report on the Effect of Iron on High-Capacity Zeolite." By Edgar G. Will, of Ohio State Dept. of Health. *Jour., AWW Ass'n*, June.

Recording Instruments In Treatment Plants

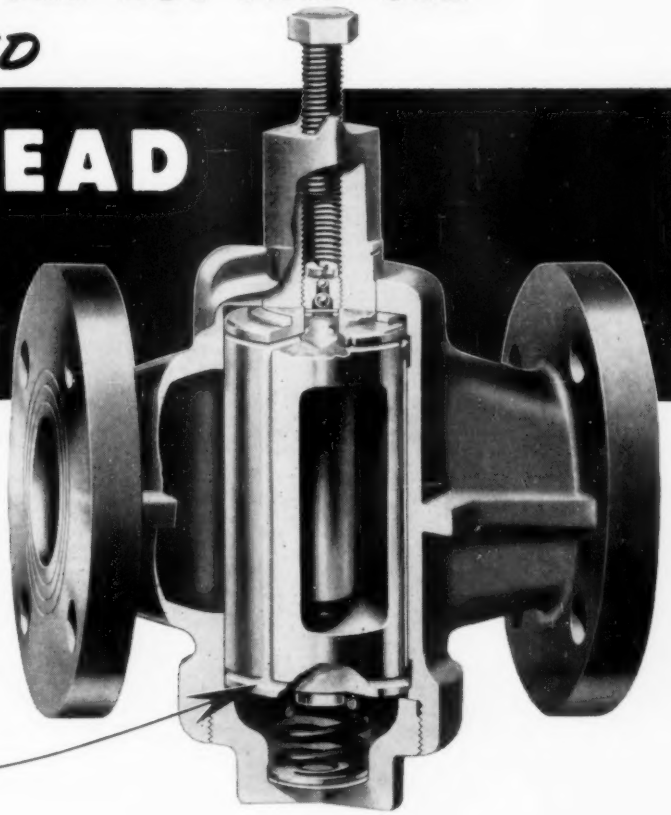
Chicago's South District Filtration Plant, believed to be the world's largest, contains 352 primary measuring and recording units which are considered to be essential in the control of water basin and tank levels, pumpage rates, and chemical dosage; in the study of operating efficiency; and in preparing consolidated operating and technical reports. They may be classified as water level recorders; residual chlorine recorders; sand expansion recorders; filter loss-of-head and rate-of-flow recorders; flowmeters; electric load meter recorders; wash-water pumpage and tank-level recorders; pH recorders; and radioactivity monitor recorder. Automatic controls are being adapted and developed for more and more features of plant operation, and instruments are now available to perform the complete operation of shutting down, washing and returning to service a remote rapid sand filter without human attention. Automatic controls and recording instruments should be considered when they will (1) reduce the danger of failure of treatment facilities; (2) aid the operators in performing their duties more efficiently; (3) reduce the labor requirements; (4) assure management that operating procedures will be carried out as intended; (5) reduce plant maintenance costs; (6) improve and stabilize the quality of the filtered water.

"Recording Instrumentation in Water Treatment Plants." By Oscar Gullans, Chief Chem. Eng. *Jour., AWW Ass'n*, May.

De-Fishing a Reservoir

The water supply of San Diego, Calif. is obtained from eight reservoirs impounding surface water. These reservoirs are examined periodically for biological, bacteriological and chemical quality. One of them, Hodges reservoir, seemed to be in a constant state of upheaval, which was attributed to the action of bottom-feeding carp stirring up the bottom mud. A contract was let to commercial fishermen to remove the carp by seining, but the result was unsatisfactory as seining close to the deep, irregular bot-

No. 5* of 12 REASONS WHY
YOU SHOULD BUY AND USE
LOW-PRICED
HOMESTEAD
Lubricated
PLUG VALVES



*SELF-FREEING PLUG PREVENTS STICKING

Homestead's exclusive completely controlled lubricant system positively prevents sticking by its instant, piston-like movement of the plug downward at the start of each lubrication. Spring and line pressure return it to stem-sealed position.

This is only **one reason why you should buy and use low-priced** HOMESTEAD LUBRICATED PLUG VALVES.

HERE ARE ALL TWELVE

1. Extra long valve life assured by very close tolerance between sealing surfaces.
2. Straight line fluid flow—streamlined ports—minimum resistance to flow—minimum pressure drop.
3. Triple head seal—two lubricant rings and reinforced Teflon stem seal prevent leakage.
4. Easy turning—plug floated on Teflon washer and reinforced Teflon ring.
5. Self-freeing plug prevents sticking.
6. Full-threaded screw prevents dirt being forced into lubricant system.
7. Quarter-turn fully opens or closes.
8. Reinforced Teflon stem seal—no cold flow—continuous, positive seal.
9. Seating surfaces protected in both open and closed positions.
10. High pressure lubricant system provides full lubricant seal around ports.
11. Leak-proof double ball and lubricant sealed check valve. No springs. No maintenance.
12. Two lubricants handle most services.

FOR CATALOG AND COMPLETE DETAILS MAIL COUPON TODAY

HOMESTEAD
VALVE MANUFACTURING COMPANY
"Serving Since 1892"
P. O. Box 40 **Coraopolis, Pa.**

Without obligation, send Reference Book 39—Section 5 on HOMESTEAD LUBRICATED PLUG VALVES.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

tom was impossible. Knowing of no way to kill the carp without killing other fish also, it was decided to kill all the fish using "Pro-Noxfish" as a piscicide, with the consent of the state health authorities, which required limiting the dose to 2 ppm, far below that which would have any physiological effect on humans. A total of 1375 gallons of the emulsion was sprayed over the 190-acre surface of the reservoir. It was divided into four areas of different average depths and each area dosed with an amount calculated to give 1 gallon to each 1.68 acre-feet. Mixing was obtained by the propeller of the boat used for spraying, and 0.75 ppm was detected at a depth of 50 ft. Fish began floating to the surface 20 minutes after spraying began; 24 hours later skiffs began collecting dead fish, and in three days 44.8 tons of fish were collected. Three days later the surface was again covered with dead fish and 64.2 tons were collected, giving a total estimated at 174,615 fish, of which 134,280 were carp. In a month all trace of the chemical had disappeared from the water and the reservoir was returned to service. Following the treatment a diatom pulse developed and the reservoir was treated with copper sulfate.

"Operation Carp on a San Diego Reservoir". By Donald A. Hoffman and Robert C. Payette, of the Water Dept. *Water & Sewage Works*, July.

Removal of Radionuclides By Water Treatment Processes

"Generally speaking, water treatment processes will not effectively reduce the activity in the water to acceptable safe limits except where the initial levels of activity are very low, certainly several orders of magnitude below 1.0 microcurie per ml level" (Equivalent to 3×10^{-5} ppm). "To protect large population centers dependent on surface waters which may become contaminated by radioactive materials, plans should be made for auxiliary water sources from possible non-contaminated supplies." This is the general conclusion reached from studies carried out at Oak Ridge National Laboratory by the PHS, the Engineer Research and Development Laboratory (Fort Belvoir) and others.

"Removal of Radionuclides From Water by Water Treatment Processes." By Roy J. Martin and Conrad P. Straub, both of Oak Ridge National Lab. *Jour., AWW Ass'n*, May.

Measuring Ground Water Movement

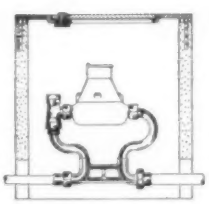
The authors report the results of an investigation intended to ascertain the adequacy of several organic, inorganic and radioactive materials in tracing the movement of water through porous media. They conclude that no single substance is likely to constitute an ideal ground water tracer under all circumstances. Of the dyes available, sodium fluorescein is probably the most satisfactory, but its use should be limited to media free of organic material and of relatively high permeability. Chloride, added in the form of salts of sodium and calcium, will generally be effective, provided that density currents or permeability variations do not result. The use of radioisotopes affords a very sensitive means of measurement and permits the detection of tracers in extremely low concentrations. Of the radioactive tracers available, only those in the considered. Iodine 131, as the iodide, anionic or nonionic form should be has shown the greatest promise but should be accompanied with sev-

PIONEERS ....of these TIME-SAVING ECONOMIES

When a meter-servicing chore seems to require more time and bother than it is worth, Ford engineers usually come up with a new idea to save time and cut costs. Each of the products in this space was pioneered by Ford to solve an expensive service problem. It pays to refer your problems to Ford FIRST.

RESETTERS

Until the Ford Resetter was developed the only way to raise a too-low meter was to dig up and remake the setting. The modern way to do the job is to remove the meter from between the old couplings, insert the Resetter and connect the meter between the flanged copper tubes.



COPPERSETTERS

The Coppersetter is a complete meter mounting and has been widely adopted for outside meter settings in shallow and medium depth service lines. The word is copyrighted; there is no Coppersetter except that made by Ford.

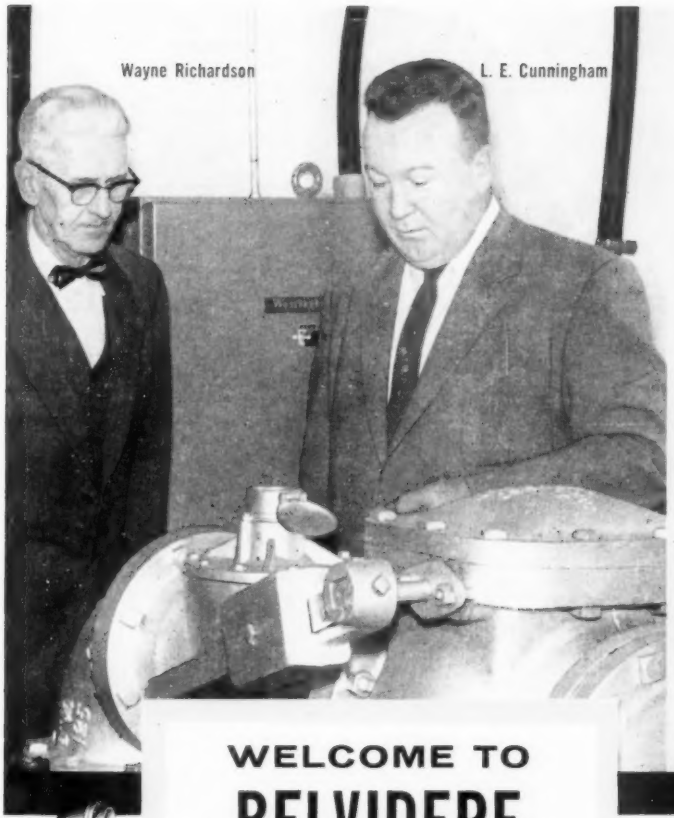
RINGSTYLE COUPLINGS

The Ringstyle idea of putting the meter nut on the coupling body from the flange end permits designing meter couplings for attaching direct to iron pipe or copper tubing. There are savings in fittings, joints, labor and space.

TESTERATE INDICATOR

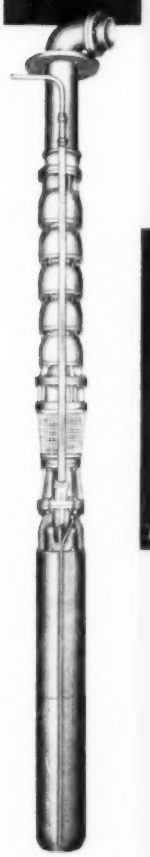
It is important to know the rate of flow at which a meter is tested. The Testerate Indicator shows the rate instantly, clearly and accurately. Introduced in 1938, there are almost two thousand in service.

THE FORD METER BOX COMPANY, INC.
FOR BETTER WATER SERVICES
Wabash, Indiana
FORD



"Here's why our city installed its sixth BJ Submersible"

Says L. E. Cunningham, Mayor of this progressive midwestern city



WELCOME TO BELVIDERE ILLINOIS

CITY OF INDUSTRIAL ADVANTAGES

Facts about Belvidere, Illinois

A friendly city of 10,000, Belvidere is located 75 miles northwest of Chicago. Its industrial advantages include abundance of water, skilled labor pool, good plant sites, low tax and utility rates, and excellent educational and recreational facilities. It is served by the Chicago and Northwestern Railroad and 26 major truck lines.

Facts about the BJ Submersible

The BJ Submersible operates completely submerged in water at any depth. This sealed, submerged unit needs no pump house and is unaffected by weather extremes, floods or dust. The BJ Submersible requires no field adjustments. Normally gives more than 20 thousand pumping hours before service is required. Silent and vibrationless.

"A dependable, protected water supply system is vital to the future growth of both our residential and industrial areas.

In the past our wells were pumped by surface motor deepwell turbines requiring pump house protection and special maintenance. In 1951 Wayne Richardson, our Waterworks Superintendent, working with R. Anderson, Engineering, replaced an old deepwell turbine with a modern Byron Jackson Submersible.

Our experience with this completely submerged pump was so satisfactory that we converted all our wells to submersible operation, having just completed the installation of the sixth unit. The combined capacity of all these units is now 5 MGD with storage facilities for 1,700,000 gallons.

The people of Belvidere are now assured a pure water supply that is completely safe from flood or other disaster conditions. And our people also benefit as taxpayers since routine maintenance is eliminated and no costly, space-consuming surface structures are necessary. Byron Jackson Submersibles have provided us with the answer to all our pumping problems."

SINCE **BJ** 1872

Byron Jackson

Division of Borg-Warner Corporation

P. O. BOX 2017A, TERMINAL ANNEX • LOS ANGELES 54, CALIFORNIA

Pier structure gets *New, Longer Life* with THORITE Nonshrink patch, THOROSEAL masonry sealer coat

Structural concrete suffers deterioration from the elements. If these surfaces had been protected from water penetration, freeze and thaw cycle would not have caused these maintenance problems. Workmen are shown cutting out defective areas, patching with THORITE without necessity of forming and then sealing surface with THOROSEAL.

THORITE 20-minute nonshrink, nonslump patching mortar has received international acceptance by men who know, Architect, Engineer and Contractor. THORITE requires no forming, permitting immediate completion of job.

"How to do it" GET OUR 16 PAGE BROCHURE

STANDARD DRY WALL PRODUCTS, INC.
NEW EAGLE, PENNA. CENTERVILLE, IND.

eral ppm of stable iodine. Natural trilium offers the ground water hydrologist an untapped opportunity for extensive surveys of underground water movement.

"Measuring Ground Water Movement With Radioactive and Chemical Tracers." By Warren J. Kaufman and Gerald T. Orlob, of the Faculty of the Univ. of California. *Jour., AWW Ass'n*, May.

Radioactive Fallout in the United States

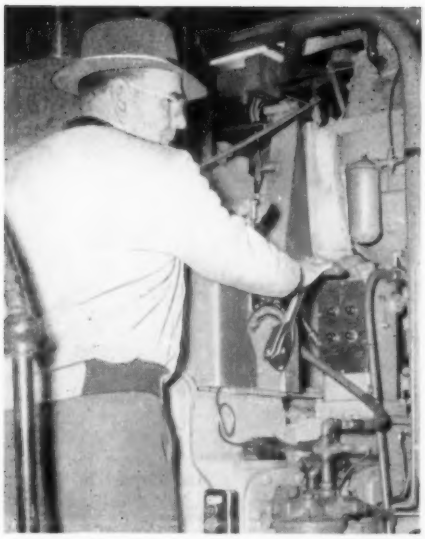
The U. S. Atomic Energy Commission, with the assistance and cooperation of the U. S. Weather Bureau, has been measuring the radioactive fallout at 89 stations in the United States since 1951, when the weapon-testing program was inaugurated in Nevada. The total fallout up to January, 1956, varies from 22 millicuries per square mile in California to 260 in Colorado, the differences being caused by the distance from Nevada and by the prevailing winds. The measured fallout includes natural radioactivity which originates from cosmic sources and from the natural radioisotopes. It is calculated that the top 12 inches of soil contains more than 1,000 curies per square mile, considerably more than the total fallout reported to date at any station.

A study of the increase in radioactivity of the Portland, Me., water supply following the Nevada tests during the winter and spring of 1955 was made by members of the faculty of Mass. Inst. of Tech. They found that the amount of strontium in the city's tap water could be increased by a factor of about 70,000 before exceeding the limits specified by the National Bureau of Standards as permissible for water that is used continuously.

"Monitoring Network for Measuring Radioactive Fallout." By Merril Eisenbud, of AEC; and "Radioactive Fallout in Water Supply at Portland, Me." By Prof. Rolf Eliassen and Robert A. Lauderdale, both of Mass. Inst. of Technology. *Jour., AWW Ass'n*, June.

Disposal of Reactor Wastes

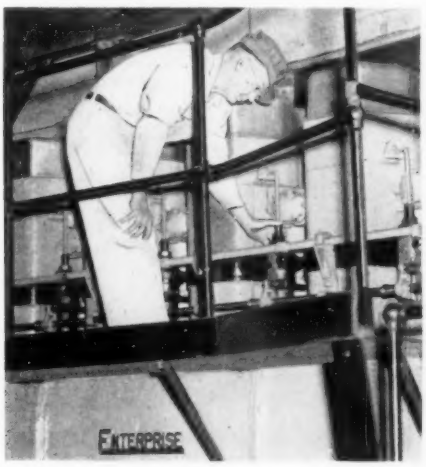
No wholly satisfactory and economical method has yet been found to dispose of the radioactive wastes which are created by atomic reactors. The methods being studied by the AEC may be generally classified as ocean disposal and land disposal. The possibilities and methods of ocean disposal are being studied by a group from Johns Hopkins University, sponsored by the Re-

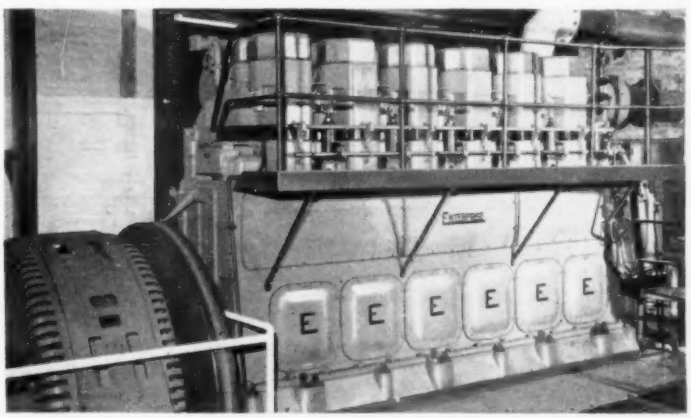


"We Added an Enterprise Dual Fuel Engine—Now Save $700 a Month on Fuel and Lube Oil Alone!"

Says JAMES J. LESLIE, Superintendent, Paulding Light & Water Works, Ohio

At the Dual Fuel "Select-O-Matic"® control, "Pete" Leslie demonstrates ease of change-over from dual fuel to straight diesel operation of 1000 kw Enterprise. Engine never drops a cycle changing either way!





The 1400 HP Enterprise has logged over 21,000 hours without any major maintenance. Valves have not been ground, rings never replaced. No overhaul will be planned until there is some evidence of work required!

Chief Engineer Perry "Jack" Jackson on routine inspection of Enterprise Turbocharged Model DGSQ-316. After two and one half years on local natural gas and diesel fuel oil No. 2, firing pressures and exhaust temperatures have remained exceptionally even.

"Our Enterprise is one of four diesels in the plant, and it carries almost all of the load, 24 hours a day. That's because it's the most economical and dependable engine we've ever operated. Whether it's on dual fuel in normal periods, or on straight diesel during light loads of 300 kw or less, this engine performs very, very well. We like the safe margin of reserve it gives us, too—even during peaking periods."

Mr. "Pete" Leslie points out what a really profitable power plant means to the city of Paulding. Electric rates have been reduced substantially. Street lighting, power for the City Hall, and a beautiful municipal swimming pool have been provided at no cost to taxpayers.

This is another example of how cities and towns throughout America benefit from dependable Enterprise Engines. Write us today for full information, or call your nearest Enterprise office. Models from 73 to 7703 HP in diesel, dual fuel, tri-fuel and spark ignited gas engines.

Over a million horsepower at work the world over!

ENTERPRISE
dependable **ENGINES**

ENTERPRISE ENGINE & MACHINERY CO.
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
Export Department, New York

Boston • Chicago • Denver • Des Moines • Fort Worth • Huntington • Jacksonville • Kansas City • Los Angeles • Minneapolis
New Orleans • New York • Philadelphia • Pittsburgh • San Diego • Seattle • St. Louis • Tulsa • Washington, D.C.

actor Engineering Division of the AEC. They find many different systems that can be exploited. Disposal of free wastes by dilution requires further study of mixing patterns, including vertical mixing. Wastes discharged for years into the bottom of a deep body of water may produce thermal-connection mixing into the overlying water. Microscopic marine life will concentrate fission products from contaminated waters and these will be further concentrated in the tissues of devourers of this microscopic life, and it is possible that marine food supply for humans will thus be seriously contaminated.

Land disposal of low-level wastes (0.50 milliroentgens per hour) is not a matter of great concern; but, except for storage in tanks, there is no experience whatever with the disposal of high-level wastes, (2 roentgens per hour). These are generally stored in underground steel or reinforced concrete tanks at a cost of $0.37 to $2.00 per gallon. To decrease their volume for storage they may be evaporated. A process is being developed whereby activities of up to 20 curies of fission products may be concentrated on a milliliter of montmorillonite clay. A large fraction of the low-level solid radioactive wastes now produced is buried in the soil in areas carefully selected with consideration of soil stability, permeability, ground water movement, chemical or zeolytic binding, and other conditions. Of low-level, short-lived radioactive liquid wastes, roughly 95% are currently disposed of in surface waters.

"Ultimate Disposal of Radioactive Reactor Wastes in the Oceans." By Charles R. Renn, Prof. of San. Eng., Johns Hopkins Univ.

"Land Disposal of Atomic-Reactor Wastes." By Arnold B. Joseph, Research Staff Asst., Johns Hopkins Univ. *Jour., AWW Ass'n,* May.

Other Articles

"Estimation of **Flow-Through Time** by the Continuous-Dose Method." Results the same as by momentary-dose method, and the former has advantages. By Michael J. Taras, of Dept. of Water Supply, Detroit. Jour. AWW Ass'n., June.

"Friction Losses in **Service Lines** and Fittings." The author thinks that ¾-in. house service lines are not large enough for present and future consumption rates; and that friction in fixtures and meters can be reduced. Gerold E. Arnold, Gen. Supt. of Philadelphia Water Dept. Jour. AWW Ass'n., June.

"The Bold Heath—Scheme of the Borough of **Widnes**", **England,** to supply 10 mgd. of which 6.25 mgd is for industrial consumption; 2 mgd of the latter will be non-potable, supplied at a lower rate. By R. A. Walton. Water & Water Engineering, June.

"**Too-Cheap Water** Fails to Block Engineering and Quality Progress." Water Works Engineering, July.

"Should Water Utilities Be Regulated By **Public Service Commissions**?" Public and private water officials cooperate with State Public Utilities Com'n in drafting California rules and standards. Water Works Engineering, July.

"**Barranquilla,** Colombia — Water Problems." By Kenneth V. Hill. Water Works Engineering, July.

"Selecting **Valves** for Water Service." By Leslie Paul, Engr. of East Bay Municipal Utility Dist., Calif. Water & Sewage Works, July.

"**Tastes and Odors.**" 33rd of a series on "Water Works Practices." By George E. Symons. Water & Sewage Works, July.

"A Water Project Sprouts in a **Dry Area,**" Aurora, Colo. By Paris L. Guy, of the Water & San. Dept. Public Works, August.

"Water For a **Resort Island**" brought more than ten miles from the Florida mainland. By Tom W. Justice. Public Works, August.

"The **Fluoridation System** at the South District Filtration Plant," Chicago, Ill. By John R. Baylis, Engr. of Water Purification. Pure Water, May.

"Conductivity-Difference Control of **Chemical Coagulation**" offers advantages over that with pH equipment. By R. H. Babcock of the Foxboro Co., and K. F. Knowlton, Supt. of Salem & Beverly Water Supply. Jour AWW Assoc., June.

"**Pump System Analysis** and Planning Methods used in the Los Angeles City Water System." By Roland Triay, Jr.; Planning Engr. Dept. of Water & Power. Jour. AWW Ass'n., June.

"Fire Protection Problems With **Undersized Mains.**" Recommends asking and following advice of local insurance inspection bureau. By Harry L. Krieger, Asst. Mgr., Ohio Inspection Bureau. Jour. AWW Ass'n., June.

"Survival of **Coxsackie Virus** in Water and Sewage". By Norman A. Clarke, Robert E. Stevenson and Paul W. Kabler, all of the Robert A. Taft San. Eng. Center. Jour. AWW Ass'n., June.

ENGINEERING MANPOWER

A Critical Problem for Highway Departments

TIMOTHY A. HARRISON

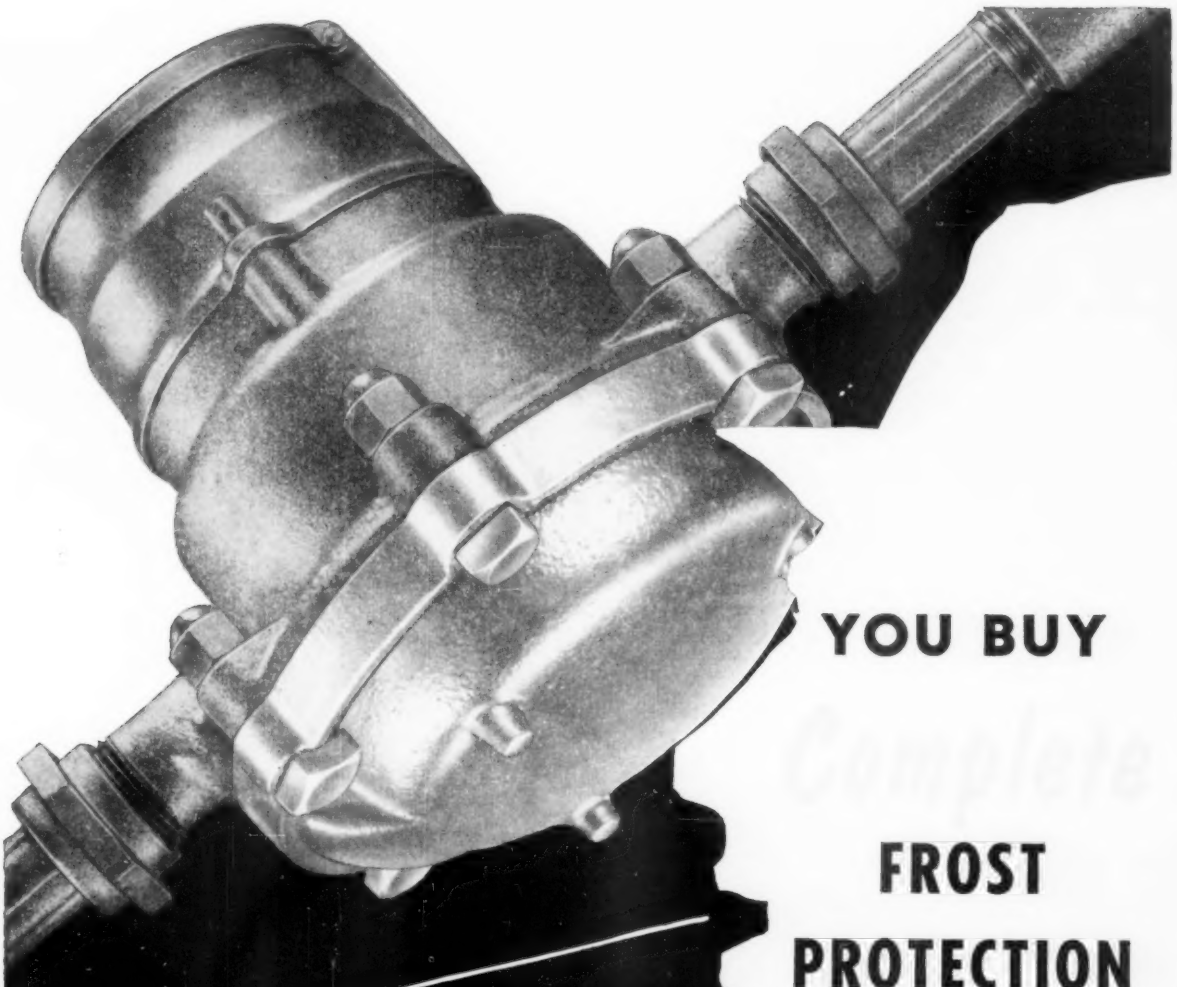
Editor, "The Highway Magazine"
Published by
Armco Drainage & Metal Products, Inc.

RECENTLY WE HAD THE occasion to talk with Professor Ellis Danner, head of the Civil Engineering Department at the University of Illinois. He is currently involved in a Highway Research Board study dealing with the shortage of engineering manpower in highway departments. He remarked that the findings thus far indicate the problem to be far more complex than is commonly believed. The existing shortage of engineers is not the whole problem as many in the highway field are coming to realize.

The alarming fact is that, in the face of the current shortage of engineers, highway departments are losing more engineers than they are able to hire. And these are trained engineers, not college graduates that have yet to get their feet wet in the complicated field of highway engineering. The problem is obviously critical. Even if highway departments could hire all the college graduates they want, these could not fill the place of an engineer with several years (or often more) experience in the field and office.

It wasn't hard for us to see in a hurry that Professor Danner had pinpointed the real problem. The acute shortage of engineering manpower for highway departments is a two-headed coin: On one side is the lack of civil engineering graduates willing to fill positions created by increased work, natural job turnover and normal retirement; on the other side is the critical problem of the ever-growing number of highway department engineers who have found the offers of private industry too attractive to pass up—thereby creating further vacancies for which replacements are unavailable. The two are integrally connected, but the latter is undoubtedly the most important to highway departments at the present time. Organizations that can not keep trained engineers for more than a few years will have little success in hiring graduates except for similar lengths of time.

The passage of the new highway construction legislation cannot help but aggravate this situation. Not only will highway departments be faced with greatly increased responsibilities requiring more engineers,



YOU BUY

Complete

FROST PROTECTION

When you buy Progressive

AMERICAN METERS

Water Departments that buy American Frost Bottom Meters have no worries. They know that the breaking pressure of the bottom has been predetermined at the factory and since it breaks by tension and not by shearing it is unaffected by flange bolt tightness. Breaking of bottom permits all internal parts including gear train parts to separate without damage. A new inexpensive Frost Bottom can be attached in a few minutes. It's as simple as that. So, let freezing weather come. You haven't a worry when you buy American!

BUFFALO METER CO.

2920 Main Street, Buffalo 14, N. Y.

but consultants, suppliers, manufacturers, contractors and other private industries associated with the highway field will also need additional engineering manpower. Competition for available engineers is already at an all-time high—and it's going to get worse as the demand, sparked by the new highway bill, further outdistances the supply.

Since everyone connected with the highway industry has a vital stake in the solution to this problem, it seemed logical to find out from highway engineers themselves what could be done to stop this migration to private industry. Accordingly, *The Highway Magazine* sponsored a contest inviting letters or papers on "What We Are Doing (or Should Do) To Keep Our Engineers." It was open to any employee of a federal, state or local highway department.

The contest is now completed and the winning paper is published in the September issue of *The Highway Magazine*. The response to the contest was extremely gratifying. Entries were received from all over the country and from individuals in a wide range of jobs. Ideas were submitted from county engineers, city engineers, junior highway engineers, personnel officers, senior design engineers and even from a chairman of a state highway commission.

That we received so many entries from many different job classifications makes one fact self-evident. Highway administrators and engineers today are very much aware of the problem—and in most cases are enough interested in their profession to want to do something about the situation. They pulled no punches in their estimate of what was wrong with their own organizations and what should be done (or is being done) to correct the trouble. This would seem to be a healthy sign—a sign that most highway engineers would stay in their respective fields if the necessary changes to correct the situation were made.

Just what is this situation that tends to make highway engineers seek greener pastures elsewhere?

There are a number of things, as we found out from reading the entries; and interestingly enough, most of the entries mentioned many of the same points—a pretty good indication that the problem is nation-wide and not restricted to isolated areas. It became obvious from the papers submitted that the problem resolves itself into five basic considerations. Highway engineers want:

(1) Challenging work that tests their knowledge and imagination, makes efficient use of their professional talent and allows them to exercise their judgment.

(2) Promotional opportunity and protection against arbitrary dismissal or "pigeon-holing" in a job.

(3) Adequate compensation in line with their duties and responsibilities and not necessarily dependent upon number of years of service.

(4) Training programs that enable them to broaden their knowledge, advance to greater responsibilities and affirm their position as contributors to the group effort.

(5) Recognition and prestige in accord with their professional status and importance to the organization.

There were a number of other ideas mentioned in one or more papers, but the five points enumerated above were by far the most prevalent. Liberal sick leave, special retirement plans, additional vacation privileges and other fringe benefits came in for some discussion in the entries, but for the most part, they were minor factors in

HIGH QUALITY HYDRANT

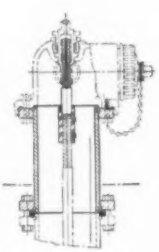
The R. D. Wood Standard Swivel Joint Hydrant with or without breakable flange and stem coupling

All Bronze Stuffing Box

Sound and simple in construction. It cannot rust or corrode. Hydrant operating thread can be greased or oiled by unscrewing one small plug.

Extension Piece

Can be inserted between hydrant head and barrel or between barrel and elbow. Installation does not require shutting off water supply.



R. D. WOOD

Public Ledger Building, Independence Square
Philadelphia 5, Pa.

comparison with the five basic considerations.

The winning paper was submitted by R. F. Milhaupt, personnel officer of the Wisconsin State Highway Commission. It was an outstanding presentation and especially significant in that it indicated a clear awareness of the problem by a personnel man rather than an engineer and that it pointed out what Wisconsin is actually *doing* to keep highway engineers. Mr. Milhaupt showed a keen grasp of the various aspects of the situation. Some of his thoughts are mentioned here.

He pointed out that any successful solution to the problem of attracting and keeping qualified engineers must offer two benefits:

(1) "The tangible benefit which the individual can see on his paycheck, in his classification or job title and in his promotional prospects for the future; and

(2) the intangible benefit which directly or indirectly contributes to raising the employee's morale, stimulating his job interest and enhancing his prestige."

Under tangible benefits, Mr. Milhaupt classified adequate compensation and promotional opportunity as the most important (see points 2 and 3 in the five basic considerations above). He went on to show how Wisconsin has provided these benefits by increasing engineers' salaries, establishing a true competitive salary plan based on merit and by broadening the highway commission organizational structure at the top supervisory levels.

For intangible benefits, Mr. Milhaupt listed such items as an efficient and properly administered training program, better utilization of professional engineering talent and recognition in keeping with the engineer's training and technical knowledge—all of which have been installed by the Wisconsin Highway Commission. He also pointed out that these benefits provide an excellent return to the state in terms of a more efficient organization.

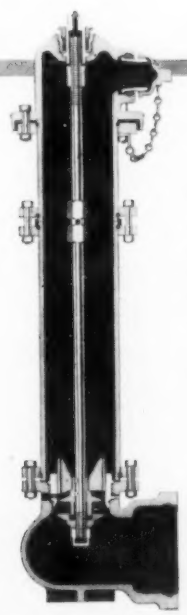
He also mentioned one additional intangible benefit that deserves special emphasis. "A personnel-conscious attitude on the part of the chief engineer or administrator can do much to reduce engineer turnover. Administrators whose personnel programs are based upon promotion by merit, like pay for like work and a sincere interest in the employee as an individual usually are not bothered with turnover worries." Sage words from a wise observer.

Personnel management is a highly-complex job requiring considerable skill in addition to constant attention to the problems at hand. Too many highway departments overlook this fact. They too often forget that they must consider the personnel problems of their engineers as well as their maintenance crews, foremen and laborers. Highway departments today are just awakening to the realization that personnel management of their supervisory and professional people is an extremely important part of a well-run organization—a fact that private industry was aware of a number of years ago.

M. C. Adkins, senior designing engineer for the Texas Highway Department, summed up the situation very well in his excellent entry. "When our engineers are given the opportunity to think and act to the best of their ability, when they are proud of the organization for which they work, and when they know that they will receive adequate financial reward and proper recognition for their efforts, then we need not be concerned about losing them." Proper personnel management will go a long way toward achieving these objectives.

AT LOWEST COST

The R. D. Wood Standard Swivel Joint Hydrant is designed to provide maximum strength and reliability at lowest possible cost. Internal friction, which can lower pressure, is reduced to the minimum, well below A.W.W.A. specifications. Changes of diameter are carefully rounded and nozzleways are scientifically tapered.



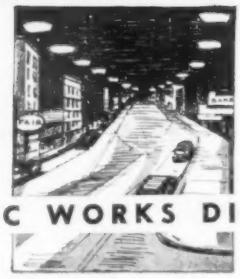
Breakable Flange and Stem Coupling

Available at slight additional cost are this specially designed flange in the standpipe and a frangible coupling in the hydrant stem. A heavy blow that would ordinarily break the hydrant will snap the ring in the flange and the coupling in the stem. Both can be replaced quickly and inexpensively. No digging is necessary.

Exterior views showing breakable swivel flange and head with steamer nozzle and two hose connections. Available with standard types of pipe connections—bell, *mechanical joint*, flange, universal or screw.

COMPANY

Manufacturers of "Sand-Spun" Pipe (centrifugally cast in sand molds) and R. D. Wood Gate Valves



PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Test Fills and Geologic Data

In preparing plans and specifications for the 236-mile Kansas turnpike, the engineers made field tests of the specifications for embankment compaction, especially on moisture-density relationships and the thickness of lift which could be worked with the 50-ton pneumatic roller and large tamping rollers. Two test fills were constructed for that purpose. Tests were made of soils such as were found along the route. Tests of the compaction obtained were made at each stage. Most lifts were 6 in. but 12-in. lifts were tried using a 50-ton pneumatic roller. The latter indicated that satisfactory compaction could not be assured without specifying the minimum number of passes. The specifications adopted called for the compaction of the top 14 in. of the embankment to 100% standard density, the next 18 in. to 95%, and 90% for the embankment below this. The soil beneath is scarified 6 in. deep and compacted. To reduce the loss of moisture by evaporation from the material being compacted, successful use was made of a commercial liquid detergent, SC-100, which acted as a wetting agent.

The Commission's Geology Dept. furnished information which made possible realistic estimates of rock quantities and types, and design for the most economical and stable backslopes. Also this data was valuable in deciding where underdrains would be necessary. With this information, contractors felt safer in offering low prices for excavation.

"Field Tests and Geological Data Helped Plan Turnpike Grading." By Ralph E. Skoog, Geologist & Soils Eng'r. *Roads and Streets*, June.

Specifications for Earthwork Are Antiquated

Earthwork is the major single item in modern highway construction. Contractors and equipment manufacturers have developed procedures and equipment for handling this; but specifications prepared by engineers have remained essentially unchanged for the past 20 years. Are they adequate for securing best results as to compaction, stability, settlement and underdrainage? Do they make efficient use of engineering manpower? In one case, the engineering cost of evaluating several items for making monthly contract payments amounted to more than the cost of construction. Do the specifications inherently assume the standing of existing contractor-engineer relationship? Many contractors specialize and have become experts in special kinds of work; the engineer supervising each kind of work should also be an expert in that kind; otherwise he is at a disad-

Luminaires to Make New York's Third Avenue World's Longest Fluorescent-Lighted Street

NEW YORK CITY's first major fluorescent street lighting installation is also to be the world's longest. As part of a "face-lifting" program now under way for Manhattan's old and famed Third Avenue, 750 fluorescent luminaires supplied by the Westinghouse Electric Corporation are being installed along a 7½-mile stretch of the avenue, all the way from the Brooklyn Bridge to the Harlem River.

Installation of the new units is moving ahead as rapidly as repaving and renovating jobs can be completed. It is hoped that the equipment will be in use by the year end.

Spaced alternately at 100-foot intervals on both sides of the 70-foot avenue, each luminaire houses four 72-inch 100-watt fluorescent lamps, providing an average of 0.8 footcandle of illumination on the pavement. Fixtures are to be mounted 26 feet above the street and tilted 30 degrees above the horizontal to illuminate the full width of the street. Each of the new four-lamp luminaires provides approximately the same light output as 1,000 watts in incandescent lighting, but, in contrast, draws only 490 watts per luminaire.

The fluorescent lamps are specially designed for street lighting service, starting and operating dependably at temperatures as low as —30 degrees F. Nominal light output is 5300 lumens per lamp, but is higher at low temperatures, a characteristic which eases visibility problems of winter weather.

NOT "HOW BIG" BUT "HOW MUCH WORK IN A YEAR"

That's a sound basis for choosing a motor grader and the CAT No. 212 is often the answer

Scarifying blacktop isn't the easiest job in the world, but you can see how this No. 212 handles it without strain. As C. W. Holdzskom, City Engineer for South Norfolk, Va., says: "We are perfectly satisfied with its operation. For our needs, the No. 212 is the right size machine."

Although this is the smallest and lowest priced grader in the Caterpillar line, it has shown that by taking a little more time it can do just about anything the larger models can. The 50 HP No. 212 shares the tough built-in stamina of all Caterpillar Motor Graders. It has balanced power, weight and traction, and it's easy to operate, with positive-acting power controls. It gives you easy, accurate steering. It offers a full range of blade positions that can be changed from ditching to bank sloping in less than a minute without leaving the seat. And it gives the operator excellent visibility of wheels and blade while seated.

Low first cost, low operating costs and long, productive work life make the No. 212 a wise choice for many communities. Your Caterpillar Dealer will be glad to demonstrate it on your job, and you can count on his reliable parts and service to protect your investment.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

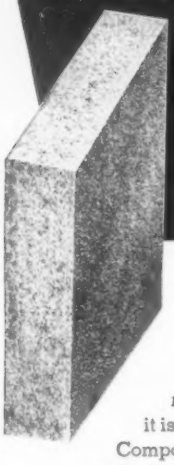
99% OF ALL CAT GRADERS EVER BUILT ARE STILL AT WORK

When Concrete joints must be kept filled

Specify and Use

SERVICISED

SELF-EXPANDING CORK



1. Expands as much as 50% beyond original thickness after compression
2. Non-extruding
3. Resilient

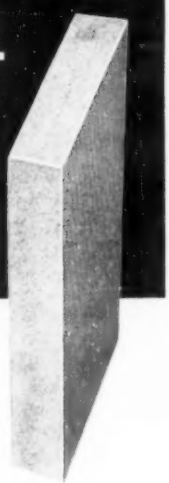
Servicised Self-Expanding Cork Joint provides *maximum joint filling* regardless of concrete movement because it is specially treated to expand to 150% of original thickness. Composed of granulated cork and synthetic resin binder molded under heat and pressure. Widely used in tunnels, outlet works, spillways, stilling basins, sewage treatment works and water filtration works.

When joints in exposed concrete must be inconspicuous...

Specify and use Servicised

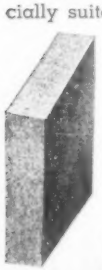
SPONGE-RUBBER

CEMENTONE®



1. Blends with color of concrete
2. Fully resilient
3. Non-extruding

Servicised Sponge Rubber Cementone Joint is composed of high quality blown sponge rubber of uniform thickness and density. Gray in color, it blends with concrete to provide a fully resilient, inconspicuous joint filler. Especially suitable for bridges, viaducts, pre-cast concrete wall panels.



SERVICISED STANDARD CORK EXPANSION JOINT

Similar in composition to Self-Expanding Cork, Standard Cork Joint has a very high recovery rate after compression —95%. It is light in color and will not extrude under compression.

Write for the Servicised Catalog. It has complete details on Servicised Premolded Joint Fillers.

SERVICISED PRODUCTS CORPORATION

6051 WEST 65th STREET • CHICAGO 38, ILLINOIS

vantage in his relations with the contractor. Inspectors also should be trained so that they know at least as much about the work they inspect as does the contractor's foreman. Preliminary to a large embankment job, test fills should be constructed, using the kinds of soil to be used in the actual construction, and the various types of equipment; this gives the inspector a chance to observe and test a wide variety of roller operations.

"Field Control of Earthwork." Paul K. Garber, Soils and Paving Eng'r. *Civil Engineering*, July.

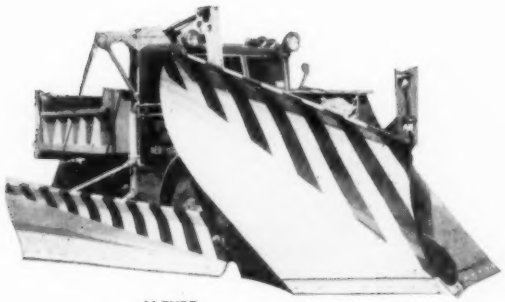
Maintenance in Greene County, Ohio

Maintenance of heavily travelled roads in Greene County includes prompt attention to trouble points the year around; the use of new construction materials, such as prestressed concrete; buying good modern equipment to replace old when accurate cost accounting shows this to be financially desirable; regular inspection and maintenance of equipment; a 3-year program to convert all gravel roads to blacktop; and use of two-way radio. Their first experience with prestressed concrete was replacing a washed-out bridge on a much-travelled road by using prestressed T beams; this was done in six weeks including wrecking the old abutments. The detour necessary meantime cost drivers about $300 a day for extra gas, and only a few days' savings paid for the additional cost of prestressed beams. The county's Motorola two-way radio system with 500-watt impact, is used by ten motor trucks and cars.

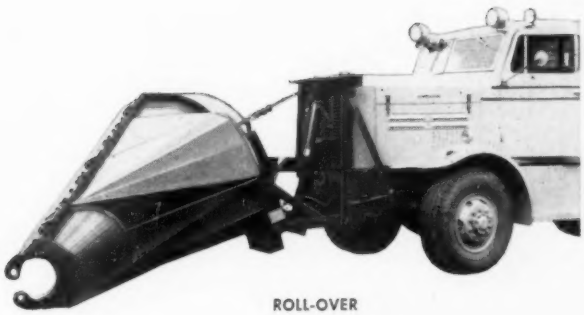
"Ohio County Equipment Helps Solve Heavy Traffic "Blues". By Fred R. Lemcke, County Eng'r. *Public Works*, August.

Controlling Construction Of Concrete Pavements

Results obtained by present methods of making compression cylinders and slump cones for testing concrete are meaningless in respect to uniformity of product. Sampling methods are slow. Slump tests take too long, as do tests for entrained air. New test methods should be used to measure water-cement ratio; strength of parts of the batch, not of the average; air content of parts, and cement distribution. The author recommends that the contractor be required to certify every week the accuracy of the scales; sieve analysis of stone and sand; complete tests of mixer performance (one load); time of mixing; time of material



V-TYPE

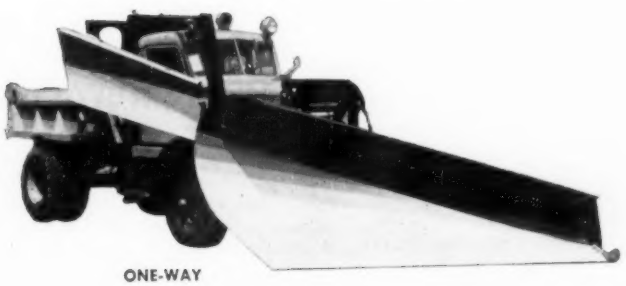


ROLL-OVER

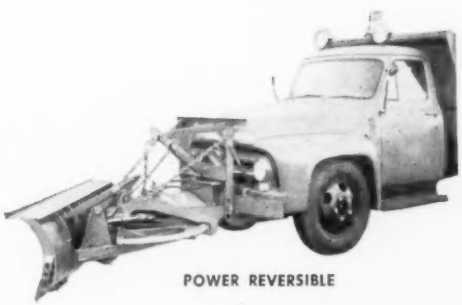
FRINK

The Standard of the Industry . . . for 35 Years

Every important Snow Plow improvement has originated at FRINK'S



ONE-WAY



POWER REVERSIBLE

FRINK V-TYPE SNO-PLOWS have long been the standard in heavy duty plowing. This model has been continually improved and refined as a result of Frink's continuous engineering research to make better plows. As a result, Frink V-Type Sno-Plows are SELF-BALLASTING; they PUSH EASIER, BEVEL SIDE BANKS; and there is NO SIDE THRUST.

THE ONLY ROLL-OVER, Taper Blade developed by any manufacturer. Hydraulically rotates from left hand to right hand plowing position in 15 seconds. This rugged plow has been very successfully used – particularly on dual super highways and airports. *Eliminates deadheading. Easier to Park.*

THE "400 SERIES" ONE-WAY Trip Blade Sno-Plows combine all the desirable features that place them ahead of the field in performance and efficiency. They are the finest speed plows manufactured. The mold-board has the taper and curvature which makes the throwing and spreading qualities better than any other one-way snow plow, yet at slow speeds these Frinks neatly windrow the snow.

THE FRINK POWER REVERSIBLE is the most recent completely redesigned Sno-Plow of the Frink line. It is the all purpose plow – plows to the left, to the right, or bulldozes straight ahead – all positions automatically set by means of one convenient cab lever even while plowing. The reversible plows city streets, expressways – cleans up intersections, parking lots, airport ramps and public areas. It is THE all purpose plow.

FRINK SNO-PLOWS

Clayton, 1000 Islands, N. Y., Frink Sno-Plows of Canada, Ltd., Toronto, Ontario

Take a New Look at Tournatractor

Tournatractor can tackle tough jobs, such as breaking up rock-seams, pavement, etc. Faster push and return save time. On long cycles, on-job and between-job moves, Tournatractor speed is doubly important.

Tournatractor's sealed power-train permits travel through water, mud, dust without loss of power. Lubricants are not washed away nor filled with abrasives. Maintenance is less since 4 wheels do work of 500 track parts.

Tournatractor takes shortest route to job, via highway or cross-country. It drives through city streets without interference to traffic . . . big, low-pressure tires do no damage to blacktop, curbs, or railroad-tracks.

Tournatractor travels and works over any type of footing to clear land, push-load scrapers, dig ditches, spread fill, stockpile materials, maintain haul roads, back-fill around culverts, pull other equipment.

Tournatractor, Angledozer—Trademark Reg. U.S. Pat. Off. CT-1104-G-2

Consider these many advantages on your work, now and in your future:

Power. . .208 hp — more than any crawler tractor in its class. Gives more pull at higher working speeds.

Traction. . .greater than ever! New, optional wide-base tires give more ground contact, better flotation.

Speed. . .forward to 17.39 mph, reverse to 7.3 mph, boost output.

Mobility. . .travels more than twice as fast as crawlers, job-to-job, under its own power. Saves time, cost of hiring flat-bed haulers and extra help to load and unload.

Shifts instantly. . .no stops, no lost momentum. Saves 5 seconds every gear shift, as much as 80 min. per 10-hour day.

Torque converter . . . eliminates shock-loads, automatically adjusts engine torque to load, provides unlimited speed-flexibility, increases operator efficiency.

4 tires vs. over 500 track parts . . .tough tires replace hundreds of exposed wearing parts. Reduce service, cut costs.

Interchangeable equipment . . . push-plate, bulldozer, Angledozer, Root Rake, Snow-Plow, tree-stinger; scrapers and other drawbar units.

See Tournatractor work on one of *your own* jobs

The best way to judge today's improved Tournatractor is to see it in action on one of your own jobs. Why not give us a call? We'll be glad to arrange a demonstration on your regular work.

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

entering mixer; time of water entering the mixer, and length of time water precedes aggregate; and time taken to discharge. Samples could be taken from first tenth, center, and last tenth of this batch. Slump tests, air tests, and compression cylinders or beams for flexural testing can be taken from all. All three of these can be bracketed with Kelly Ball Tests, Chace Air Meter tests, and Hime-Willis test for cement content. This work would be done by the contractor with the approval of the engineer and with an inspecting engineer present if so required. This mixer and plant performance test would be used as a guide, to indicate from week to week improvement in quality.

"Suggested Quality Control Method For Highway Concrete". By Glenway Maxon. *Roads and Streets*, July.

Electronic Computer In Highway Design

Electronic computers are being rapidly adopted by highway departments to aid in solving engineering problems, owing largely to their promotion by the Bureau of Public Roads. At present there are about five manufacturers actively producing machines and adapting them to highway needs, and several more are preparing to do so. All machines are basically the same. Data from field notes are fed in proper sequence to a programmed machine, are added, subtracted, multiplied and divided according to previously ordered instructions and the answers are turned out on a typed sheet in the form of station by station cut-and-fill data, singly and cumulative, slope stake locations, or plane survey data such as traverse closures. There are five units of the machine: an input device with a command and general data input function; a control unit, which records the instructions from the input device and follows them through the entire calculation; the arithmetic portion, which is a mechanical calculating machine connected electrically with the control unit, some steps of which are performed in millionths of a second; fourth, a memory machine which receives the answers to the calculations and supplies them in the order called for by preestablished control program; and fifth, the output device which converts machine results into typewritten, useable form. The input material may be fed into the machine by keyboard, punched card, paper tape or magnetic tape. Savings in time are most apparent where the machine is used

in conjunction with fast survey methods. No cross sections need be prepared. Most manufacturers will rent machines, which are quite expensive. It is probable that before long techniques of programming and photogrammetric surveying will become a regular part of the curriculum in technical schools.

"The Electronic Computer—Top Tool in Highway Design". *Engineering News-Record*, July 12.

Litter Barrels on Washington State Highways

To help prevent the littering of its highways, the Washington Dept. of Highways is placing litter barrels at convenient places where cars can turn off the highways to stop or picnic. Motorists are urged to keep their litter in sacks until it can be put in the litter barrels. For barrels 50-gal. used paint or oil drums are utilized; and signs erected reading "Litter Barrels ¼ Mile". The barrels are painted highway orange. Signs or slogans are used, such as "Help Keep Washington Clean", or "Place Your Trash in Litter Sacks and Barrels". It is believed the public is more favorably affected by a "Do" request than a "Don't." Service station managers are urged to provide their customers with litter sacks and clips for attaching them to the sides of automobiles. More barrels are being placed this year with the aim of having one every 25 miles. That the barrels are being used is shown by the fact that many of them have to be emptied several times a week.

"Litter Barrels Help Motorists Practice Good Housekeeping". By J. L. Stackhouse, Maint. Eng'r. *Better Roads*, June.

Michigan's New Concrete Specifications

Michigan's new specifications for concrete paving, which go into effect in 1957, are of the result type, wherever possible. It is believed that the chief avenue of improvement is by better density control of subgrade and subbase. On some projects a layer of processed aggregates over the sand subbase will be required. If a contractor elects to run his paver between the forms, any resultant rutting must be ironed out and rolled before placing concrete. Air-entrained cement will be required, with the air content between 4 and 7%. An extra half-sack of cement per cu. yd. must be added to the standard 5¼-sack mix when the contractor elects to use a single coarse aggregate size (1½-in. max)

"D Handyman" does all these jobs faster and cheaper

One D Tournapull does the work of several pieces of high-priced specialized equipment. It does the basic jobs illustrated and many, many more . . . as a scraper, hauler, spread unit, snow-plow and utility dozer. This fast, self-propelled unit works economically on both big and small assignments. And when job is finished, handy "D" runs to the next project at speeds to 29.5 mph.

7½-yd. "D" has more capacity than average dump truck . . . can be shovel-loaded. Normally, however, it self-loads, travels where a truck cannot go, and spreads in places where needed. "D" is faster, more maneuverable, more versatile than any crawler-scraper combination. Rig can handle two or three widely-separated assignments in a single day. It's an all-around, one-man maintenance crew.

You will like the way "D Handyman" moves refuse and dirt on sanitary landfills, helps eliminate odors and vermin. How it cleans ditches, builds up road shoulders, daylights curves, gravels roads and streets, and keeps your voters happy.

Taxpayers will like the speed at which projects are completed and the resulting lower tax costs. Why not call us, or write for complete facts and figures?

Tournapull—Trademark Reg. U.S. Pat. Off. DP-1179-P-2

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

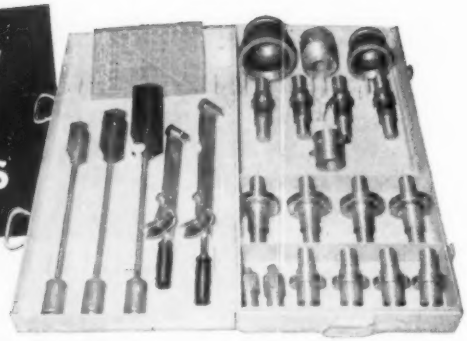
Grades roads

Rebuilds shoulders

Plows snow

Backfills around culverts

"IN-PLACE" SHEAR READINGS



FAST, ACCURATE, WITH NEW ACKER VANE TEST KIT!

The Acker Vane Shear Test Kit has everything needed to obtain fast, accurate, "in-place" shear readings to depths of 100 feet!

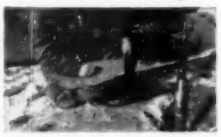
It's easy to use and provides accurate soils information at low cost! For ease in carrying, the entire set of tools are packaged in a handy steel kit.

Write today for prices and free illustrated folder 700! PW

Assemble the Vane to the Rod!

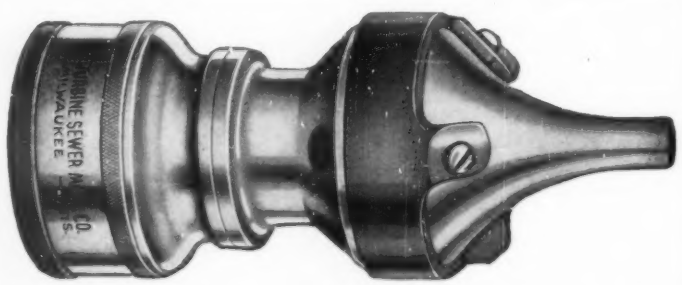
Insert in Casing and Apply Pressure to the Torque Wrench!

Consult the Torque Chart for Accurate Reading!



ACKER DRILL CO., INC. 725 W. Lackawanna Avenue Scranton, Penna.

a complete line of Soil Sampling Tools, Diamond and Shot Core Drills, Drilling Accessories and Equipment



Type GK Go-Getter Self-Propelling Sewer Cleaning Nozzle

One of the many items in our complete line of Sewer Cleaning Equipment.

SEE OUR NEW TURCO MAXI-POWER MODELS

Setting absolute new standards of strength, performance and operating ease.

Your Headquarters for Sewer Cleaning Tools & Equipment

Write for FREE Catalog

Turbine Sewer Machine Co.

DIVISION OF CHAS. H. STEHLING CO.

1303 North Fourth Street • Milwaukee 12, Wisconsin

rather than the 2-in. and 1-in. combination. If a pavement tests from 2 to 3% under the specified factor, a 3% cut in payment is made; if undercut more than 3%, the department may elect to accept the pavement and dock the contractor 10%, or require replacement. The sliding scale of payment reductions as a penalty for skimping slab thickness is being continued. Curing methods will be confined to white pigmented membrane or waterproofing paper.

"Michigan Revising Concrete Paving Specs." *Roads and Streets*, June.

Overhead Signs and Traffic Signals

On multi-lane highways, drivers on inside lanes frequently can not see signs located on the shoulders. Also it is difficult for drivers to watch traffic ahead and look for roadside signs at the same time. Overhead signs seems to be the only answer. In Missouri, such signs are suspended from two lines of steel cable supported by creosoted wooden poles, but the appearance is not attractive and it is anticipated that trusses will be used instead. Trusses in use for overhead signs in the states of Washington, New York, California, Virginia, Delaware, Michigan and Florida are mentioned by the author.

"Overhead Signing". By Leon W. Corder, Traffic Eng'r, Missouri State H'way Dept. *Public Works*, August.

Other Articles

New Construction Dollars Scarce? Use **Asphaltic Overlay** and Stage Construction Techniques." Public Works, August.

"**Controlled Access** Stabilizing Influence on Economic Growth." By Harold L. Plummer, Chairman, Wisconsin Hwy. Comn." With Proper Control of Access Modern Highways Should Last." By R. H. Baldock, Oregon State Hwy. Engr. "Controlled-Access Roads Will Play Important Role in Future." By I. A. Anderson, Comr. of Highways of Va. Better Roads, June.

"**Controlled Access** Highways Stimulate Industrial Development." By Charles M. Ziegler, State Hwy. Com'r, Michigan. "Protect Investment in Arterial Highways with Control of Access." By W. F. Childs, Jr., Eng., Maryland State Road Comn. Better Roads, July.

"Process Earthwork Quantities Through **Accounting Machines,"** saved 5,000 man-hours of engineering time. By George Letourneaux. Better Roads, July.

"Practical Pointers on **Compaction of Embankments** for Superintendents and Foremen." By J. V. Clarke, Virginia Dept. of Highways. Roads and Streets, July.

NOW! 12½ Kilowatts You Can Take Anywhere!

New ELECTRALL®—exclusive on INTERNATIONAL TRUCKS

This is the latest in quick, sure portable power for every electrical purpose—115 to 230-volts, single or 3-phase power for motors up to 10 horsepower.

The new ELECTRALL generator is driven by the truck's power take-off. It requires no separate fuel, oil or maintenance. Takes very little body space. Easy to remove, too.

It's an INTERNATIONAL exclusive—factory-installed as optional equipment on model S-120, S-130 pickups and the four-wheel-drive S-120 (4x4).

Call your INTERNATIONAL Dealer or Branch for a demonstration, today.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

World's Most Versatile Portable Power

- Operates chain saw for tree trimming
- Powers air compressor for pavement breakers and tree sprayers
- Operates sewer repair equipment
- Operates cement mixers
- Supplies current for welding and soldering equipment
- Powers bus and trolley repair equipment
- Operates post hole diggers
- Powers electric lawn mowers and weed cutters

Emergency Power, Too

- Supplies current for flood lights
- Operates sump pumps
- Powers inhalators
- Supplies current for medical uses
- Operates radio transmitters and receivers

INTERNATIONAL® TRUCKS

All-Truck Built to save you the BIG money!

Motor Trucks • Crawler Tractors • Construction Equipment
McCormick® Farm Equipment and Farmall® Tractors

"Chattanooga Solves **Asphalt Maintenance** Problem on City Streets With Surface Heater-Planer." By L. H. Templeton, Supt. of Pub. Wks. Public Works, August.

"Preparation for Winter in Massachusetts." Organization, equipment, snow fence, chloride storage, drainage, etc. By G. G. Love, Maint. Eng., Dept. of Pub. Wks. Public Works, August.

"Cost Comparison of **Force Account** and Contract Construction on Five Secondary Projects in North Carolina" shows that, exclusive of profit, contract work was performed at lower construction cost than State force work. By Fred B. Farrell and Morgan J. Kilpatrick, of Bureau of Public Roads. Public Roads, August.

"Getting the Most of Your **Equipment** Dollar." By H. T. Larmore, of Allis-Chalmers Mfg. Co. Roads and Streets, June.

"Snow Control Consists of Doing a Lot of Things." By C. Arthur Elliott, County Eng., Greene Co., Iowa, Public Works, August.

"We Have Standardized on **Soil-Cement** Streets." By E. W. Talley, Street Com'r, Union City, Tenn. Public Works, August.

"Testing Bituminous Mixtures—To Be Sure." Importance of daily tests by inspectors. By Merle L. Nelson, Calif. Div. of Highways. Roads and Streets, June.

"Use of **Lean Rolled Concrete** in Road Construction" in England. By Jack Mercer. Contractors Record, June 27 and July 4.

"Air Force Issues New Criteria For **Runway Design**" for heavy loads. Roads and Streets, July.

• • •

Water Changes Overnight Stop Into Booming Tourist Center

Water supply was a serious problem at the little group of tourist cabins built by C. L. White near the entrance to Carlsbad Caverns. All water had to be hauled 20 miles to the over-night stop on the desert, and although twelve wells were drilled, they were all dry. Finally the thirteenth well was tried, "At an unlikely spot," says Jack White, son of the founder, "but we had tried all the 'likely' ones." At approximately 1,000 feet, good water was struck, and the way was opened to transform the cabins into a tourist oasis.

After finding a water supply, the Whites selected a Reda Submergible Pump for use in the well. Today the owners have two good wells and three Reda pumps, with two in operation and one as a spare. Two are 30 hp units; one is 22½ hp, which will soon be replaced by another 30 hp unit. The peak demand on the water supply is approximately 30,000 gallons per day, though the pumps can supply far in excess of this amount. One pump has been in operation for four years, pumping 100 gallons a minute from an 800 to 900-foot setting, and has not required servicing during that time.

Real growth started when water came to White's City. Today, the city is landscaped, has several restaurants, filling stations and even a large swimming pool and fire department. A continued expansion of facilities enables White's to accommodate between nine hundred to a thousand persons each night, truly a monument to the importance of water.

• • •

Aerial Photographs Bring Tax Rolls to Date

Aerial photography is being used in Cook County, Ill., to locate for taxing purposes new buildings and other improvements. These include those where building permits are not reported to the assessor and those where permits have not been obtained. In one area alone, there were 220 new buildings and improvements that had not been placed on the tax roll, including a factory located in a wooded area.

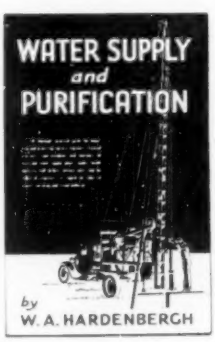
QUICKLY...EASILY...
AND *ECONOMICALLY*
CONVERT YOUR "PICK-UP"
TO A MODERN *SERVICE* TRUCK!

Mount Stahl Utility Side Boxes on any make or model of pick-up truck. All-steel, welded, furnished complete with mounting brackets, bolts and instructions. Keep your tools dry, safe, organized. Thousands of pairs in use. *Write today for Literature and Name of Nearest Distributor.*

STAHL—BUILDER OF UTILITY BODIES FOR THE NATION'S BEST-KNOWN UTILITIES.

Water Supply and Purification

by Col. W. A. Hardenbergh



A Useful Book For Your Engineering Library Only $6.50

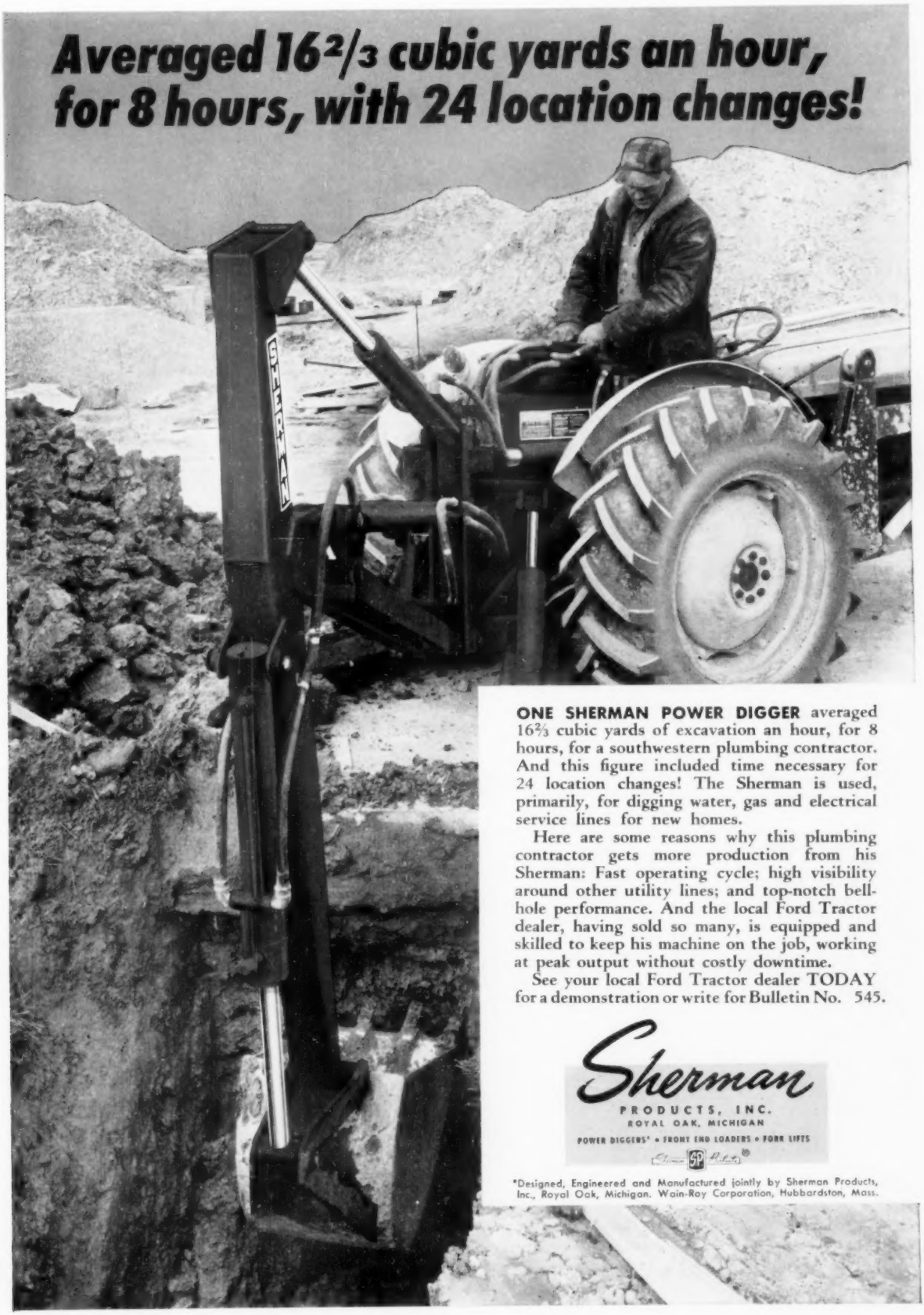
Write to:

Book Department
Public Works Magazine
200 South Broad Street
Ridgewood, New Jersey

AN authoritative yet simple treatment of the subject by one of the nation's foremost authorities, whose editorial and field work have brought him in close contact with the problems that trouble the average engineer. Design examples of all kinds are worked out in detail to illustrate practical, up-to-date methods.
Among the major changes introduced in this latest edition are the following: the chapters on ground water, on filtration, and on laying pipe and maintaining lines have been almost completely rewritten; the chapters on pipe conduits and on disinfection have been revised to bring the material in them up to date and a new chapter has been added on fluoridation.

Order your copy today

Averaged 16 2/3 cubic yards an hour, for 8 hours, with 24 location changes!



ONE SHERMAN POWER DIGGER averaged 16⅔ cubic yards of excavation an hour, for 8 hours, for a southwestern plumbing contractor. And this figure included time necessary for 24 location changes! The Sherman is used, primarily, for digging water, gas and electrical service lines for new homes.

Here are some reasons why this plumbing contractor gets more production from his Sherman: Fast operating cycle; high visibility around other utility lines; and top-notch bell-hole performance. And the local Ford Tractor dealer, having sold so many, is equipped and skilled to keep his machine on the job, working at peak output without costly downtime.

See your local Ford Tractor dealer TODAY for a demonstration or write for Bulletin No. 545.

Sherman

PRODUCTS, INC.

ROYAL OAK, MICHIGAN

POWER DIGGERS* • FRONT END LOADERS • FORK LIFTS

*Designed, Engineered and Manufactured jointly by Sherman Products, Inc., Royal Oak, Michigan, Wain-Roy Corporation, Hubbardston, Mass.

● GRADER, one of 22 operated by Brown County Highway Dept., gets a steam cleaning that takes off oil and asphalt as well as normal road dirt.

STEAM CLEANER

Helps in SNOW and ICE CONTROL

TALKING OF A new Malsbary high pressure combination steam cleaner, E. Francis Brunette, highway commissioner of Brown Co., Wisc., says: "It's the best machine we have ever had." Purchased late last winter, Brown County, on the edge of Wisconsin's north country, pressed the unit into duty as a quick cure for problems that used to cause a lot of winter headaches; but it works as well on normal shop cleaning work.

The unit is used to steam-thaw snow and ice from snow plows and trucks to get the equipment ready to roll again on short notice by Stanley Queoff, superintendent of the Duck Creek shop of the County Highway Department. The shop also provides maintenance for eight squad cars of the county traffic patrol, and the cleaner is used to quick-thaw ice from car frames.

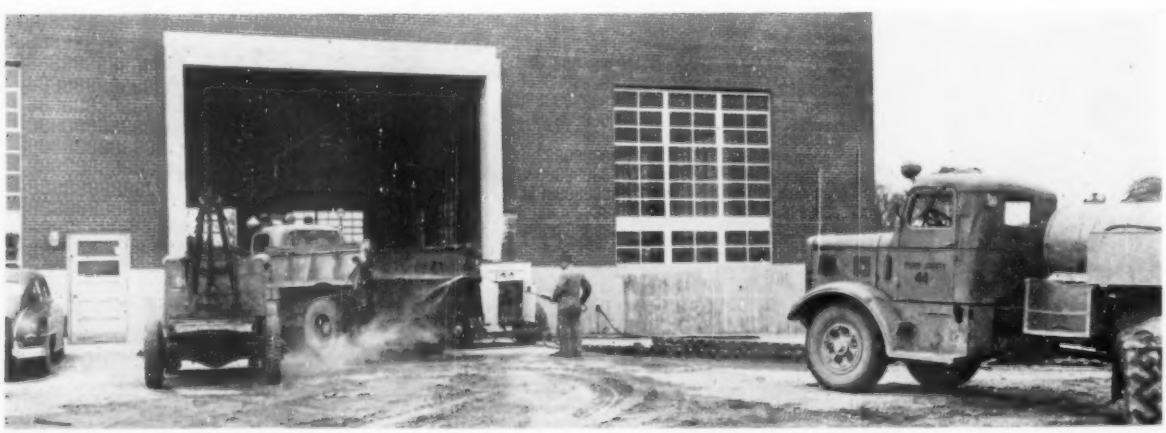
When spring thaws threaten to flood roads, the Malsbary cleaner serves as an extra culvert-thawing unit. Mounted on a two-wheel frame and equipped with both an electric power plant and a gasoline engine, it can operate on the road or at the main shop or any of the three outlying smaller shops.

Summer Projects Too

During summer road-building, the Malsbary cleaner is kept on the job at projects to clean the blacktop mixing plant and the heavy equipment used to spread and haul blacktop. All county equipment ordinarily goes under the quick steam nozzle at least twice a year, and blacktop equipment is cleaned "every chance we get," to quote Mr. Queoff.

The road building equipment normally cleaned includes 22 graders and 19 ten-ton trucks. The unit is operated with from 125 to 150 pounds pressure under normal use. It averages five to six hours daily use five days a week. In the five months the cleaner has been in use, there has been no breakdowns and no maintenance costs.

Before changing to steam cleaning, the shop crew washed equipment with water, soaked dirty or blacktop-coated parts in fuel oil overnight, rinsed them off in the morning. The time saved by the cleaner permits assignment of other tasks to shop workers formerly occupied full-time on equipment cleaning. But even more important is the fact that equipment is getting more frequent attention. No trucks or graders are out of action simply because they need cleaning, and the unit is helping in the department's toughest assignment — keeping highways open and safe during winter storms.



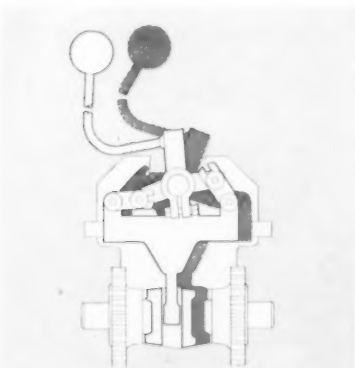
● TOUGH JOB MADE EASY. Worker aims high pressure hot solution from Malsbury cleaner at blacktop hauling dump truck.

Report from the Dallas-Fort Worth Turnpike Job

"The Allis-Chalmers Forty Five motor grader has the

BEST CONTROLS I'VE EVER TOUCHED"

That's what veteran motor grader operator R. C. Fryer of Telephone, Texas, says about the new mechanical, toggle-type control levers on the Allis-Chalmers Forty Five motor grader he is operating for the J. C. Watson Construction Co., Dallas, Texas.



FORTY FIVE
120 brake hp • 23,800 lb

And here's why Fryer is so enthusiastic. Toggle-type controls move gears into operating position surely, quickly when operator moves lever . . . but with *no* wrist-snapping kickback. Levers stay put—can't fight back. With no backlash to worry about, Fryer does precision jobs faster and easier.

You've got to see it to believe it

R. C. Fryer is a veteran of the four-mule Fresno days, and his enthusiasm is proof that the Forty Five is motor grader news worth looking into. Check and you'll find toggle-type controls are only one of many features that mean new performance and new operating ease.

The big Allis-Chalmers diesel engine provides real lugging ability. The ROLL-AWAY moldboard rolls the load instead of pushing it . . . moves it faster with less effort. Fully enclosed power steering, new accelerator-decelerator pedal, real operator comfort, excellent visibility, all add up to the kind of production and long-life service you want.

See the Forty Five. Try the Forty Five. Find out for yourself the many advantages that will help you get top performance and big production on your jobs.

Your Allis-Chalmers dealer has complete facilities to serve you—factory-trained sales and service personnel, factory-approved service equipment and complete stocks of True Original Parts.

ROLL-AWAY is an Allis-Chalmers trademark.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Syndets in Activated Sludge Plants

Large-scale experiments have been conducted at the Mogden Works of the Middlesex main drainage department, England, to learn the effect of synthetic detergents on the operation of the activated sludge process. The chief chemist reports that their presence in sewage has reduced the effective purification capacity by about 20%. Their harmful effects are minimized when the sludge is well oxidized, of high density, and present in reasonable amounts. Discharge of unoxidized syndets along with the purified effluent into the river is unavoidable. Foam formed on the tanks, sometimes 10 ft. high, especially following sales drives of agents for household detergents. Attempts to destroy the foam by spraying with water or with kerosene or diesel oil, or by vacuum or electrical effects were unsatisfactory. Control was obtained, however, by treating the sewage to the point of advanced nitrification. Certain antifoaming agents were found to be effective and reasonably economic.

"Syndets Cut Purification Capacity by One Fifth." By W. T. Lockett, Chief Chemist. *Municipal Engineering*, June 22.

Water-Tight Joints In Concrete Tanks

In enlarging the Bowery Bay Sewage Treatment Plant, New York City, the Dept. of Public Works is building 30 concrete tanks for sedimentation, digestion and other purposes. All expansion and construction joints are made leak proof by use of metal joint steps. For this purpose they specify fabricated nickel-copper alloy, 24-gauge sheets. This material is approximately 2/3 nickel and 1/3 copper. It is very resistant to corrosion, has a tensile strength of 78,000 psi, and almost exactly the same coefficient of expansion as concrete.

"Monel Used for Water Stops and Expansion Joints in New York Sewage Treatment Plant." PUBLIC WORKS, August.

Financing Sewer Extensions in Massachusetts

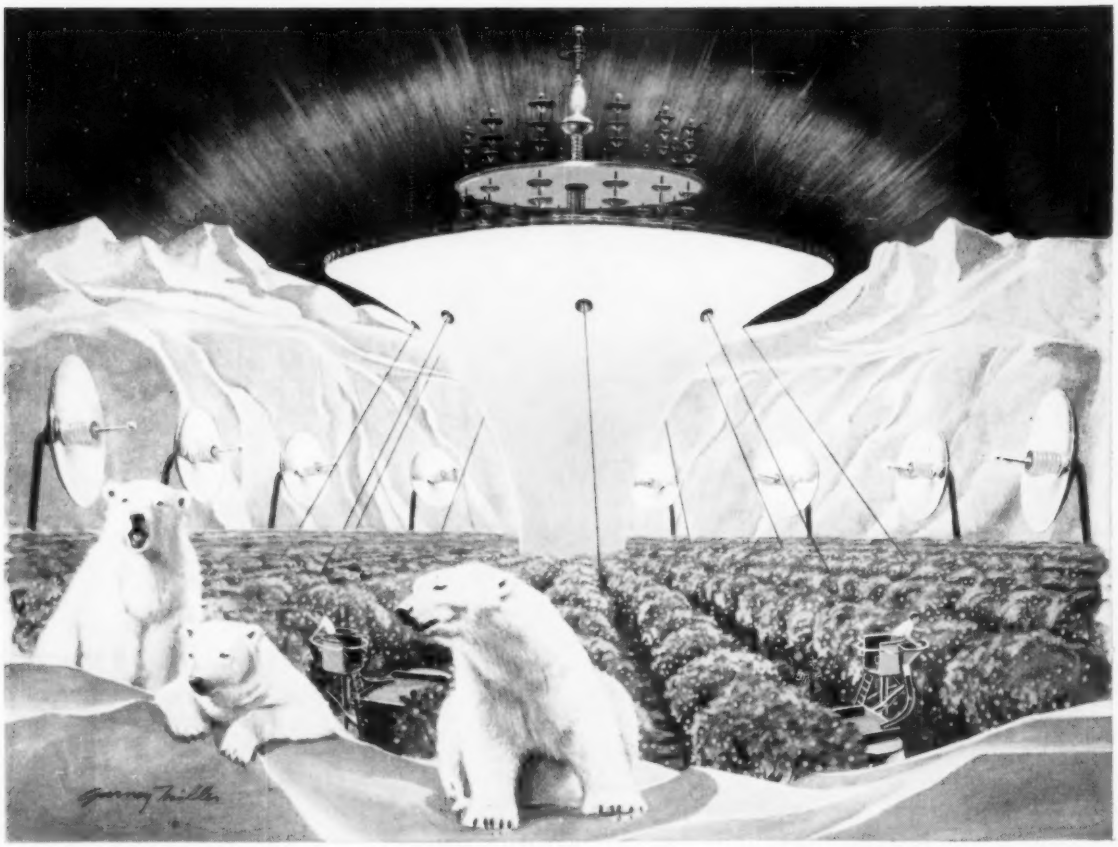
The General Laws of the State of Massachusetts provide that, in financing sewerage systems, the city shall be assessed not less than 1/4 nor more than 2/3 of the cost of laying out, constructing, maintaining and repairing common sewers. For financing sewer extensions, each community attempts to develop some formula of painless financing. The State Dept. of Public Health, through a questionnaire sent to all municipalities in the state having public sewerage systems, learned that 39 of them financed sewer extensions on the front foot basis; five municipalities financed on an area basis, usually with a maximum chargeable depth of 100 or 125 ft. for the property; 28 of the municipalities financed on a combination of the front foot method and the area method; 54 of the municipalities financed their extensions directly from general taxation with no specific charges to the persons directly benefited, while three municipalities assessed the actual cost of the construction directly on the persons benefited.

In the case of new subdivisions, 60 of the communities required that the sewers be installed and paid for by the developer, while 31 municipalities did not have such a requirement.

There were five methods of charging for house connections: On the basis of actual cost; a fixed sum; a unit foot cost; general taxation; or paid for by the property owner. Financing, maintaining and operating sewerage systems are done by general taxation, or by fixed charge

Versatile Unit Helps Public Works Department

THIS RIG is a familiar sight to residents of Brunswick, Georgia, where it is used by the city's Public Works Department for water and sewer maintenance and improvement. The department provides sanitary sewer service for about 95 percent of the populace. In 1956, this International 300 Utility tractor, with Henry loader and backhoe, is scheduled to put in about 7,000 feet of 12-inch water main, 15,000 feet of 8-inch sewer pipe and 5,000 feet of 6-inch sewer pipe. In the photo the unit is shown trenching for part of the 8-inch sewer installation. During a five-hour period it dug 275 lineal feet of trench, averaging 5 feet deep and 32 inches wide. This was for a sewer line.



Huge solar engines imprisoning the heat of the sun may create islands of fertility in icy wastelands, thus vastly increasing the productive food areas of the earth.

100 years from now...

WE MAY GROW ORANGES AT THE POLES!

What will the world be like generations from now? Wonderful new products and methods will make living easier, pleasanter, safer. But in this marvelous new era, one old friend will still serve efficiently. Water and gas will be carried by rugged cast iron pipe laid today. For more than seventy American water and gas utilities, cast iron mains over a century old are still serving dependably. And modern cast iron pipe ...centrifugally cast and quality controlled...is far tougher and more durable.

U.S. Pipe is proud to be one of the leaders in a forward-looking industry whose service to the world is measured in centuries.

U.S. cast iron PIPE

FOR WATER, GAS, SEWERAGE AND INDUSTRIAL SERVICE

CAST IRON

U. S. PIPE AND FOUNDRY COMPANY, General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

for each service connection or family, or a charge based on water consumption; or by a combination of these.

"Sewer Rentals and Sewer Extension Charges in Massachusetts." By Clarence I. Sterling, Jr., Chf. San. Engr., Mass. Dept. of Pub. Health. *Sewage and Industrial Wastes,* June.

Sewage Disposal In Mass Subdivisions

The septic tank and subsurface drain field is a suitable method of domestic sewage disposal where, and only where, there is adequate drainage, soil conditions and water table, and not more than one family dwelling per acre. Sewerage is the only practical substitute, and in mass building projects should be installed when the homes are built. It can often be demonstrated that the average cost of installing, maintaining and operating a septic tank system is equal to, and in many cases more than a monthly sewer service charge for a safe and trouble-free method of sewage disposal. In Florida a builder can install sewers at a cost ranging from $150 to $250 a lot. The cost of treatment facilities for 500 families should lie between $300 and $400 per dwelling. By collecting sewage service charges, the builder may cover operating, maintenance and amortization costs. The prevention of undesirable septic tank construction should be aggressively promoted by government officials, by builders, and by insuring and financing agencies.

"Sewage Disposal in Mass. Subdivision Building." By David B. Lee, Director of San. Eng., Florida State Bd. of Health. PUBLIC WORKS, August.

JC-60® SEWER JOINTS

. . . STOP INFILTRATION

Infiltration of soil water into a sewer line greatly increases pumping and operation costs at the disposal plant. JC-60 bottle-tight joints prevent the infiltration of soil water by adhering to primed pipe joints with a tenacity of over 300 p.s.i., far greater than most other sewer jointing compounds. You are assured of lower pumping costs and long term service, with a minimum of costly repairs, when you specify JC-60.

JC-60 was developed by the manufacturers of GK (R) and is fully protected under United States Patent No. 2,675,365.

Get the complete facts. Write for your copy of Bulletin M20-3.

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

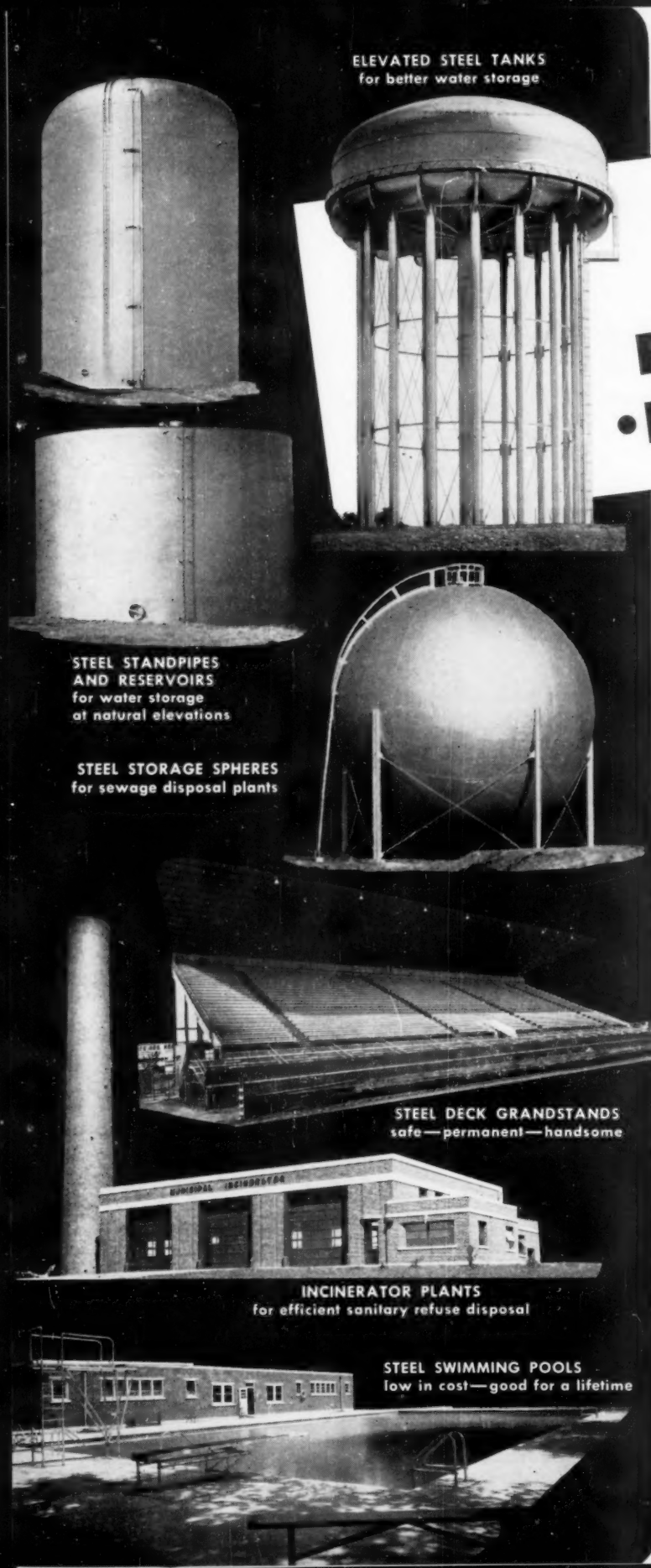
Saran as a Filter Medium

At the Minneapolis-St. Paul Sewage Treatment Plant, for ten years prior to 1955 the solids in the sludge cake from the vacuum filters averaged 31.6%. During this time napped 8-oz. Canton flannel had been used as a filter medium. In 1955 this was changed to 32 x 32 mesh Saran cloth woven from a 10-mil monofilament Saran plastic yarn, and the dry solids fell to 27.3%. At the same time there was a drastic reduction in the amount of chemicals used for sludge conditioning. The life of the flannel filter cloth had averaged 465 hours before it was blinded so badly as to be useless, and the filter speeds ranged from 7 to 14 revolutions per hour. With Saran cloth the life averaged 5,743 hours and two are still in use after more than 10,000 hours. The reduction in iron coagulant and lime used has saved over $32,000. Also it was possible to reduce the filter washing rate from once every hour to once every two hours. There have been no deleterious effects in over-all plant operation; efficiency of removal has been maintained. They are investigating two radically different filters, the Komline-Sanderson coilspring filter and the Eimco Roto-Belt, employing a woven metal filter medium.

"Vacuum Filtration of Raw Sludge." By Kerwin L. Mick and Scott E. Linsley, Chief and Asst. Eng'rs. *Water & Sewage Works,* July.

Sewage Treatment At Buffalo, New York

This article contains the statement, unusual during recent years, that "At present the city may be considered stabilized both in area and population." The present domestic sewage loading of the treatment plant is equal to the wastes



PITTSBURGH •DES MOINES

SERVES WITH STEEL

the American Municipality

The strength, permanence and economy of steel join with wide experience, fine craftsmanship and complete responsibility in Pittsburgh-Des Moines' construction for the modern community. Dependable, low-cost water storage . . . efficient refuse disposal . . . better facilities for recreation . . . permanent, economical mass outdoor seating . . . these are P-DM specialties providing maximum value for every invested dollar. • Write for descriptive brochures on the products in which you are interested, and let us consult on your needs.

PITTSBURGH • DES MOINES STEEL CO.

Plants at PITTSBURGH, DES MOINES and SANTA CLARA

Sales Offices at:

PITTSBURGH (25) ..... **3418 Neville Island**
NEWARK (2) ..... **218 Industrial Office Bldg.**
CHICAGO (3) ..... **1222 First National Bank Building**
LOS ANGELES (48) ..... **6399 Wilshire Blvd.**
DES MOINES (8) ..... **919 Tuttle Street**
DALLAS (1) ..... **1223 Praetorian Building**
SEATTLE ..... **526 Lane Street**
SANTA CLARA, CAL. ..... **625 Alviso Road**

from approximately 610,000 persons plus industrial and commercial wastes with a population equivalent of 300,000. The Bird Island treatment plant went into operation in 1938. Beginning in 1950 the plant has been enlarged and modernized. The original plant contained 4 sedimentation tanks, which removed 33% of the suspended solids, and 4 storage tanks with a total capacity of 1 cu. ft. per capita. Sludge from the storage tanks was filtered and incinerated. Floating material collected on the tops of the tanks, occasionally more than 15 ft. thick. Also grit collected in the bottoms, approximately 750 cu. yd. in one tank, 70% of which was sand. This so reduced the volume available for gas production that it became necessary to purchase fuel oil for operating the plant, and sludge removal was difficult. Also the supernatant from the tanks carried an average of 2.9% of dry solids. The recent additions to the plant include 4 digesters, the old tanks being used for second-stage digestion. The new tanks have cone bottoms with slopes of 2.5 to 1, stirring facilities for recirculating sludge and gas and heating the mixed sludge. Two-stage counter-flow elutriation is provided, using lake water. The revised plant started operation in 1955.

"Buffalo Sludge Disposal Facilities." By Frederick W. Crane, George F. Fynn, of the Buffalo Sewer Authority; and Charles R. Velzy. *Sewage and Industrial Wastes*, June.

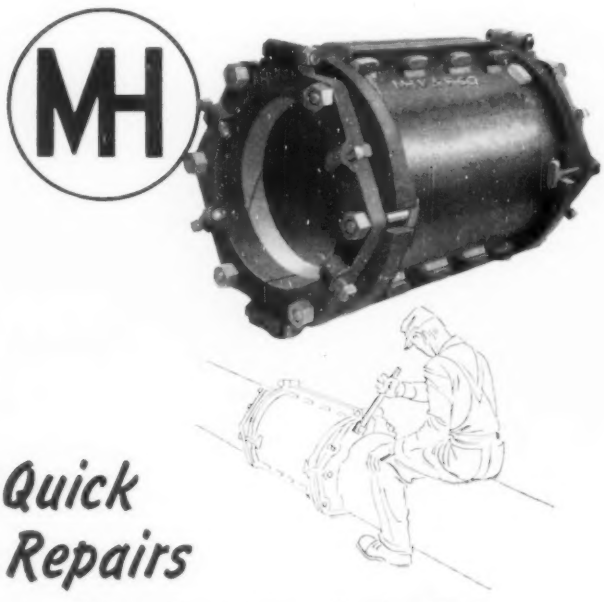
Elutriation and Vacuum Filtration

The author describes the principle of elutriation, defining an elutriated sludge as "one that has had the alkalinity of its biochemically fouled water reduced by dilution, sedimentation and decantation in water of lower alkalinity. Several methods of using the elutriation principle are described, and modifications in procedure, such as interstage elutriation for increasing the percentage of solids in sludge prior to dewatering. Some methods of conditioning sludge for vacuum filtration, and the construction and operation of filters, are criticized in several points: The conditioning mixing equipment is usually too large; feeding conditioned sludge to the filter pan through inverted piping is quite wrong; constantly agitating the conditioned sludge in the filter while the drum is rotating is detrimental. It is very important to avoid high submergence of the filter drum, especially when handling well-flocculated sludges. Avoid a drum submergence above the level where the swinging agitator should come out of submergence. The filter agitator should be operated only one or two minutes every hour or half-hour. The ideal filter medium has zero resistance to filtration, is easily cleaned and relatively permanent. String discharge filters take some advantage of this idea; the coil filter aims to take full advantage of it.

"Conditioning and Vacuum Filtration of Sludge." By Albert L. Genter. *Sewage and Industrial Wastes*, July.

Accelerated Sludge Digestion at Columbus.

Since May, 1953, the city of Columbus has been operating one of its digestion tanks by the process of accelerating digestion, using equipment furnished for the proprietary "Catalytic Reduction Process." The tank used for the test is 70 ft. in diameter with a capacity of 106,000 cu. ft. The principal feature of the equipment is piping and a compressor for collecting digestion gas from



For Quick Repairs Use Mechanical Joint

M & H REPAIR SLEEVES

This sleeve makes a quick, permanent repair to a cracked or damaged main. It is easy to install – a good item to keep in stock for emergency use.

Supplied with the sleeve are split end-gaskets, split glands or follower rings, and longitudinal gaskets. Installation consists simply of placing the two halves of the sleeve and accessories around a broken pipe and bolting tight the joints. The longitudinal gaskets of the sleeve fit against the end gaskets, making a water-tight rubber seal. End gaskets are supplied to fit Classes AB or CD pit cast pipe, or Classes 100, 150, 200 and 250 centrifugally cast pipe. Available in sizes 4-inch to 16-inch.

M & H VALVE AND FITTINGS COMPANY, ANNISTON, ALABAMA

M&H PRODUCTS FOR WATER WORKS • FILTER PLANTS INDUSTRY • SEWAGE DISPOSAL AND FIRE PROTECTION

Here's Proof of M-B Packer Superiority

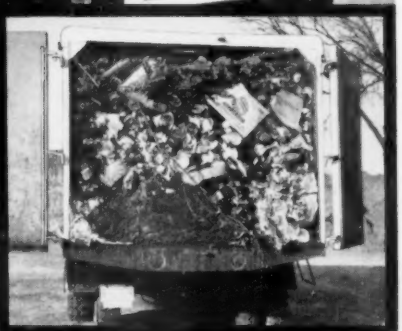
one haul does it all!

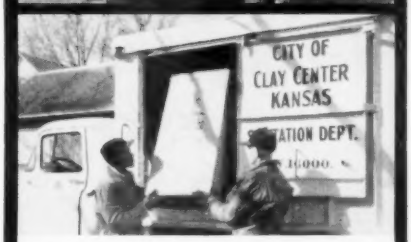
Look at the load in this M-B Packer Body! Springy evergreen branches, cardboard boxes, jumbo tin cans, wet garbage, gritty ashes, unwieldy branches — as tough an assortment of refuse you'll find anywhere! Only the M-B Packer Body with exclusive *progressive compaction* can load hard-to-pack material like this without pre-selection, double handling and call-backs.

Convenient side loading doors on both sides of the body are big enough for two collectors to work side-by-side. In alleys and other off-street locations four men can load at once. A powerful, roof-to-floor packing plate makes it easy to pack dozens of items that ordinary units can't touch. There's no need to baby your M-B Packer . . . it's engineered for long-life and rugged service with more blocks of collection from each route.

And you get added utility with the M-B Packer Body. Many cities and towns have found that the van-type design and flat, reinforced roof of the body make it the ideal unit for hauling park equipment, traffic markers, sand, snow, nursery stock, etc. Only with the M-B do you get this extra *bonus* feature!

"See the M-B Packer—Public Works Congress—Booth #A-47 & #A-48."





NO ITEM TOO BULKY! City of Clay Center, Kansas finds the M-B Packer Body ideal for both commercial and residential pick up. This unit makes approximately 500 residential stops for refuse and garbage in a six hour period.

DUMPS FASTER! Smooth walls, floor and ceiling of the body make load ejection fast and easy. There's no need for expensive hydraulic dumping mechanisms—no "upending" of truck when dumping. And you get the added economy of a smaller truck chassis.

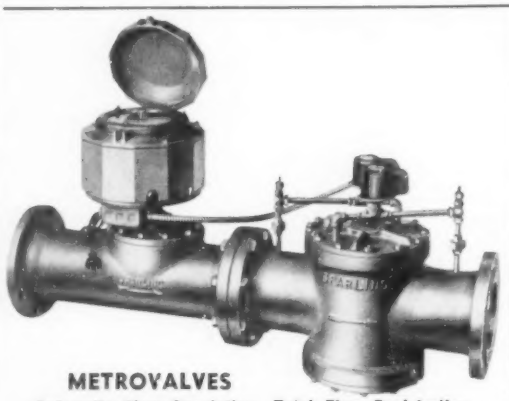
PACKER BODIES • LINE MARKERS • SWEEPERS • PAINTS AND BEADS

M-B CORPORATION

NEW HOLSTEIN, WIS.

MANUFACTURERS OF QUALITY MUNICIPAL AND CONSTRUCTION EQUIPMENT SINCE 1907

flow information at your finger tip!



- MAIN-LINE METERS
- FLOW and CHEMICAL FEED CONTROLS
- INSTRUMENTS

METROVALVES

Automatic Flow Regulation—Total Flow Registration

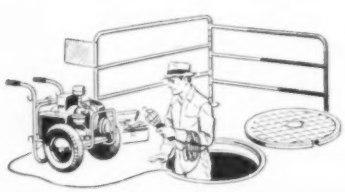
Select the required flow by simply setting a pointer to the desired dial position. Total flow is easily read on the counter type clock. Ideal for either remote telemeter applications or on the spot control.

Contact any Sparling Office for complete information.

SPARLING METER COMPANY
Incorporated
225 NORTH TEMPLE CITY BLVD., EL MONTE, CALIF.

ATLANTA 3	66 Luckie Street NW	945 North Main St.	LOS ANGELES
BOSTON 8	6 Beacon Street	650 First Avenue West	ROSELLE, N. J.
CHICAGO 8	1500 South Western Ave.	85 Industrial St.	SAN FRANCISCO 24
CINCINNATI 2	626 Broadway	1932 First Avenue	SEATTLE 1
DALLAS 1	505 No. Ervay St.	207 Queens Quay West	TORONTO, CAN.
KANSAS CITY 6, MO.	6 E. Eleventh St.	248 London Rd.	ROMFORD, ENGLAND

KOHLER Electric Plants
for portable light and power
wherever, whenever needed



On-the-job electricity for floodlights and power tools speeds work, saves man hours in street repairs, maintenance of sewage and water pipes. Kohler automatic stand-by plants, sizes 1000 watts to 35 KW, keep essential equipment running in sewage treatment and water filtration plants when storms or accidents cut off central station power. Install *before* the emergency. Write for illustrated folder H-21.

Model 2.5M25, *2500 watts, 115 volt AC. Manual starting. Other sizes, 500 watts to 35 KW.*

Kohler Co., Kohler, Wisconsin
Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS
AIR-COOLED ENGINES • PRECISION CONTROLS

the gas dome in the center of the roof of the digester and distributing it into the digester liquid over an area 6 ft. in diameter in the bottom of the tank. The raw sludge is fed into the digester in the center of the rising column of gas. Digested sludge is withdrawn at the same rate as the raw sludge is fed, and there is no supernatant. The gas is fed into the tank continuously at 75 cfm. Sludge loadings on other tanks of the same size but operated conventionally have been approximately 9,000 lb. per day, but this tank has been loaded at 27,000 to 30,000 lb., and occasionally at 60,000 to 70,000 lb. When weekly samples of the tank contents show a gradual increase in the amount of volatile acids during a period of 4 weeks, the loadings are reduced. Experiments are under way for improving concentration of solids in the digested sludge and producing a satisfactory supernatant, by pumping the digested sludge into a second concentration tank and allowing it to settle, using one cencentration tank for two to four primary digesters. Although the loading on this tank has been double and the detention time less than half that of the conventional tanks, the percentage reduction of volatile solids is comparable to that obtained in the conventional digesters.

"Accelerated Sludge Digestion Experience at Columbus, Ohio." By James H. Blodgett, Mgr., Sewage Treatment Plant. *Sewage and Industrial Wastes*, July.

Other Articles

"**Automatic Controls** Start and Stop Sewage Pumping Engines" in the recently constructed sewage treatment plants in Puerto Rico. By Peter B. Castro, of the Puerto Rico Aqueduct and Sewer Authority. Public **Works**, August.

"Hydraulic Behavior of **Storm Water Inlets.**" A time-saving method of approximately determining the capacities of 22 types of inlets. By Paul Bock, Wen Hsiung Li, and John C. Geyer, all of Johns Hopkins Univ. Sewage and Industrial Wastes, June.

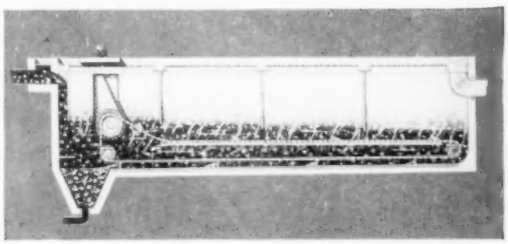
"**Sewer Odors.**" Control by use of biological additives being studied at Oklahoma City. By George W. Reid, Assoc. Prof., and **Charles Imel, student,** Univ. of Oklahoma; and W. W. Baker, City Eng'r. Public Works, August.

"Design and Construction of a **Large Intercepting Sewer**" in New Rochelle, N. Y. By Lawrence G. Rice and Eugene J. Auffant. Sewage and Industrial Wastes, July.

"Efficiency of a Small High-Rate Trickling Filter Plant at **Jerusalem, Israel.**" By Meir Rigbi, Aaron Amramy and Hillel Shuval, all of the Ministry

THE REX VERTI-FLO

works like magic in cutting high settling costs



The amazing ability of Rex Verti-Flo Clarifiers to reduce costs...assure clearer effluent...increase over-all plant efficiency... is almost magical. Actually the Verti-Flo design *divides* a horizontal-flow settling tank into a series of smaller, vertical-flow cells.

What does this unique design mean? It means more tank capacity—up to *four* times more than conventional settling tanks. In existing tanks, Verti-Flo will at least double your present capacity. In new construction, Verti-Flo® saves on both construction and equipment costs since you can plan for smaller tanks. Detention times are from one-fourth to one-half those required in conventional tanks and yet you get an effluent of maximum clarity.

Whether you specify equipment or operate a plant, you should know the facts about Rex Verti-Flo. Why not have the advantages of Rex® Verti-Flo in your plant? For complete details, mail the coupon today for your copy of Bulletin 52-77. You'll be happy you did.

These typical Verti-Flo users are getting increased efficiency...lower costs...clearer effluent

Water Treatment Plants

Fairmont, Minnesota
U. S. Penitentiary, McNeil Island, Washington
Ashland, Oregon
Roseburg, Oregon
Kansas State Penitentiary, Lansing, Kansas
Corvallis, Oregon
Florence, Oregon
Valencia, Venezuela
Sweet Home, Oregon
Fort Wayne, Indiana
Belleview, Washington
Washington Water Power Co. Clarkston, Washington
Somerset, Pennsylvania
Federal Reformatory for Women Alderson, West Virginia

Waste Treatment Plants

Pentagon Building Arlington, Virginia
Kirkland, Washington

Industrial Waste Treatment Plants

Johns-Manville Corp. Finderne, New Jersey
Combined Locks Paper Co. Combined Locks, Wis.
Kohler Company Kohler, Wisconsin
Maynard Electric Steel Casting Company Milwaukee, Wisconsin
The Ruberoid Company Bound Brook, New Jersey
Wisconsin Car Wash Co. Milwaukee, Wisconsin

CHAIN BELT COMPANY

Milwaukee 1, Wisconsin

CHAIN Belt Company 56-203
4722 W. Greenfield Ave.
Milwaukee 1, Wis.
Send me my copy of informative Verti-Flo Bulletin No. 52-77.

Name .....
Title .....
Address .....
City ..... *State* .....

"Buying on price alone is like marrying for beauty—regret is just a matter of time."

We consider ease of operation, maintenance, service and life of the valve equally important and engineer our valves in line with this thinking. That's why some of our valves have been in continual use for over 45 years and are still operating at peak performance!

Technical bulletins, describing each of our valves in detail, gladly sent on request.

GOLDEN ANDERSON *Valve Specialty Company*

1244 RIDGE AVE., PITTSBURGH 33, PA.

Designers and Manufacturers of VALVES FOR AUTOMATION

Low-Cost Blade Makes Your Light Tractor an Efficient Earth Mover!

A Heavy-Duty Tool for Landscaping, Grading, Ditching, Scraping, Backfilling.

One man can operate the DANUSER BLADE by himself and make adjustments without leaving the tractor seat. Blade uses the tractor three-point suspension principle, with adapter kits available for older models. It is raised and lowered by the tractor's hydraulic system, and turns all the way around so you can push with it.

Rugged construction throughout. Built of reinforced welded structural steel and heavy tubular members. Abrasion-resistant moldboard with replaceable, standard grader cutting edge. Moldboard mounting is supported on two oversize tapered bearings to maintain stability. It shifts 8 inches right or left of center for cutting beyond tractor wheel line.

Danuser built the original rear-mounted blade, and is still producing the finest tool of its kind on the market. Thousands are in daily use throughout the world. Tested and approved by tractor manufacturers.

If you will give us the model of your tractor, we will be glad to furnish complete descriptive material.

"Quality Since 1910"

DANUSER MACHINE CO.

533-44 East 3rd Street • Fulton, Missouri

of Health. Sewage and Industrial Wastes, July.

"New Equipment for the Activated Sludge Process." Performance of the **Aero-Accelator**. By A. A. Kalinske, of Infilco, and A. W. Busch, Assoc. Prof. of San. Eng., Rice Institute. Water & Sewage Works, July.

"Thoughts on **Biological Filtration.**" A 5-page review of its history, with suggestions for future developments. By H. H. Stanbridge, of the Inst. of Sewage Purification. Contractors Record, July 4 and 11.

BOOKS IN BRIEF

(Other books on page 62)

SOIL-TESTING METHODS FOR SOIL-CEMENT

This bulletin contains four papers presented at the Highway Research Board meeting in January, 1955. "Preparing Base-Course Materials for Disturbed-Soil Indicator Tests," by Harold S. Gillette, covers a cooperative research study to ascertain the differences in results of the disturbed soil indicator tests when one laboratory used the dry method and the other laboratory the wet method of preparing the same sample. "Rubber-Balloon Apparatus for Measuring Densities of Soils in Place," by R. L. Handy and D. T. Davidson, describes the development and use of a rubber-balloon apparatus for measuring densities in place on level, sloping or vertical faces. "Neutron and Gamma-Ray method for Measuring Moisture Content and Density to Control Field Compaction," by Robert Horonjeff and Donald F. Javete, discusses the procedures and the practicability of using this method for moisture and density. The results of field tests upon a sandy loam are given. "Simplified Methods of Testing Soil-Cement Mixtures," by J. A. Leadabrand and L. T. Norling, discusses modifications and methods for shortening standard laboratory testing of both ASTM and AASHO methods. Copies at 90 cents each from Highway Research Board, 2101 Constitution, Washington, D. C.

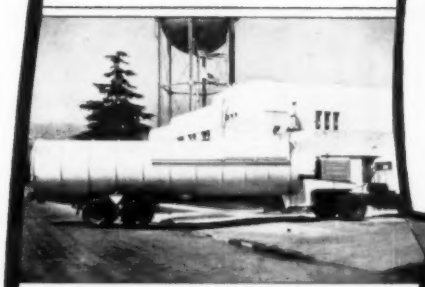
VIBRATIONS AND STRESSES IN GIRDER BRIDGES

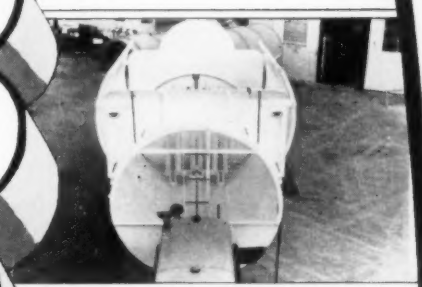
Publication 124 contains six papers presented before the Highway Research Board. The first reports measurements of dynamic deflections in five typical designs of simple-span girder bridges. Amplitudes of vibration at mid-span were 18 to 40 percent of the maximum static de-

PAK-MOR TRAILERS, for BIG Refuse Handling Problems

You'll haul bigger refuse loads at less cost with Pak-Mor trailers.

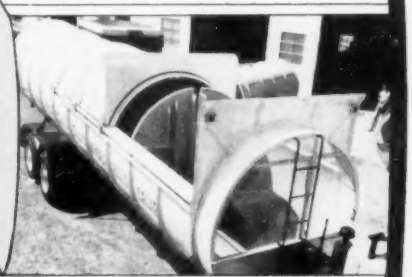
B





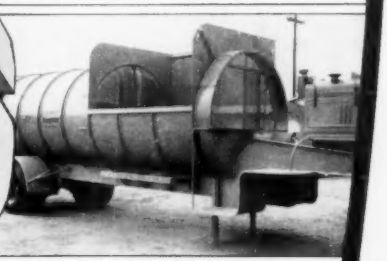
- ★ Eliminates Small Load Travel to Dump.
- ★ Loads Garbage from Ramp, Hopper and By Hoist.
- ★ Provides Central Refuse Dumping Stations.
- ★ Trailers Supply Own Power.
- ★ Provides Streamlined Refuse Collection Method.
- ★ Drastically Reduces Operational Costs.

D



If concentrated refuse pick-ups or long hauls to the dump are increasing your collection costs, Pak-Mor's trailers are designed and engineered to make profitable operation a reality. For further information write . . .

B



PAK-MORS WILL BE AT BOX A-2 AND A-3 APWA CONVENTION, FT. WORTH

SANITATION FOR THE NATION

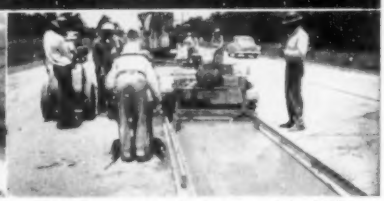
PAK-MOR

MANUFACTURING COMPANY

LOOP 13 & ROOSEVELT AVE. POST OFFICE BOX 6147 WA 3-4317 SAN ANTONIO, TEXAS
EXPORT DIVISION — TIFCO INTER-AMERICAN CORP. P. O. BOX 13361 HOUSTON, TEXAS

YOU CAN BID LOWER AND MAKE MORE PROFIT with a DOTMAR Curb, Gutter, Sidewalk Paver!

Dotmar Paver with extensions paves integral gutter, curb and sidewalk.



Dotmar with extensions paves state highway median strip.

Dotmar paves gutter on expressway. A truly versatile machine.

Dotmar paves curb and gutter; over 8' per minute. Total job 14 miles long.

Hundreds of contractors are cutting costs and increasing profits with a Dotmar Paver. Pays for itself in first mile of paving. Greater concrete yield. Easy to operate. Trowels for any shape of curb, gutter, sidewalk or highway strip. Send for Catalog 56.

MAKERS OF AIR ACE HAMMER AND TOOLS
"The size of a pistol—Power Like A Cannon".

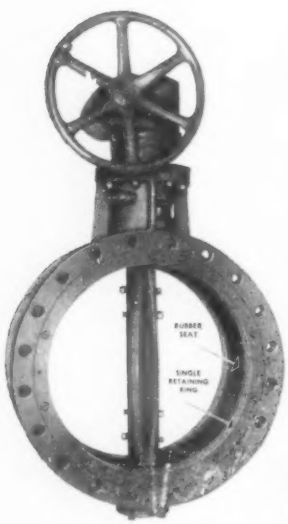
Dotmar INDUSTRIES Inc.

533 HANSELMAN BUILDING KALAMAZOO, MICHIGAN

Positive drop-tight shut-off

Easy . . . Efficient . . . Economical with

LEOPOLD
Rubber Seated
BUTTERFLY VALVES



In this design, the seat is of resilient neoprene rubber or pure gum rubber, vulcanized around a steel ring insert, and held in place by a keeper ring. The steel ring, which is "continuous" to eliminate abnormal wearing, increases the firmness of the seat and assures longer service life.

Whether operated manually or by automatic controls, Leopold Butterfly Valves always provide a positive shut-off that's bubble-tight. Made in sizes 6" to 72".

Leopold *Write today for descriptive literature!*

F. B. LEOPOLD CO., INC.
2413 W. CARSON STREET, PITTSBURGH 4, PA.

COMPLETE WATER PURIFICATION AND FILTER PLANT EQUIPMENT • BUTTERFLY VALVES
FILTER OPERATING TABLES • MIXING EQUIPMENT • DRY CHEMICAL FEEDERS

flections. The second describes dynamic effects of live loads on highway bridges: (1) Impulses due to speed with load rolling smoothly, (2) shock resulting from irregularities in deck or approaches; and (3) resonance effects of repetition loads which may combine with or interfere with the natural frequency vibration of a structure. The applications of new electronic strain recording equipment are described in the third paper with the results obtained in testing two three-span continuous plate girder bridges. The fourth reports studies of vibration of a three-span continuous I-beam highway bridge. A study of vibrations and deflections in an eight-span bridge, previously tested for static load effects, is described in the fifth; the last paper describes research at the University of Illinois on highway bridge impact. Price: $2.55; Highway Research Board, 2101 Constitution Ave., N. W., Washington, D. C.

SIXTEEN HUNDRED AMERICAN STANDARDS

This 56-page bulletin lists 1600 American Standards of which 275 are in the field of civil engineering and construction. It also describes the work of the American Standards Association and gives information on how to purchase American Standards. Copies free from the American Standards Association, 70 East 45th St., New York 17, New York.

HIGHWAY CONSTRUCTION INDUSTRY

The 1956 edition of the ARBA Task Force Reports on a Long Range National Highway Program, includes the findings based on the exhaustive studies by the engineering profession, leaders of industry and officials in government. Copies are $2. from the American Road Builders Association, World Center Building, Washington 6, D. C.

TWELVE MAJOR TUNNELING PROJECTS

This booklet contains a study of 12 major tunneling projects constructed in the Western Hemisphere in recent years. Each case history is a report of the excavating and concreting problems encountered and successfully solved on these projects. The three basic tunnel types, highway, railway and water tunnels, are illustrated by photos and accompanying texts. Write The Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio for free copies.

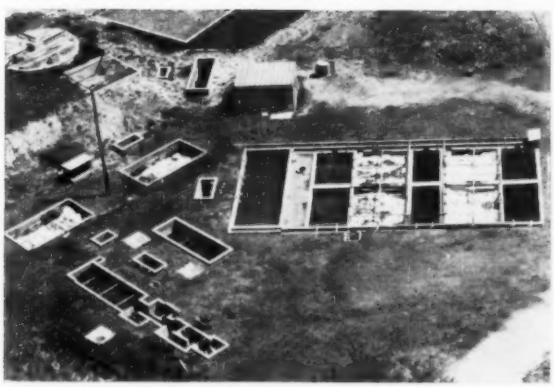
While you are in Texas...

at the A. P. W. A. Congress and Equipment Show

look into

HAYS SUBMERGED CONTACT AERATION

A PROVEN PROCESS FOR ECONOMICAL, SIMPLE SEWAGE TREATMENT IN SMALL CITIES, INSTITUTIONS, SUBDIVISIONS, ETC.



City of McGregor, Texas. Original plant in 1939, and enlarged to 5,500 population in 1955. Design: 380,000 g.p.d 0.17 lb. BOD per capita.

Dorwin Shopping Centre, Windsor, Ontario. Design: 100 Imperial gallons per capita, 0.17 lb. BOD, with additional capacity for certain industrial waste.

8 outstanding advantages make it to your advantage to investigate Hays Process first

1. **It Is a Natural Process.** Successful plant operation does not depend upon chemical feeders, complex mechanical mixers or moving distributors. Flow is continuous through the units as in a natural stream.

2. **Requires Little Installation Space.** Compact design, provision of large biological contact area per unit of plan area, together with efficient methods of sludge handling, reduce the land required to a minimum.

3. **Practically no Head Loss in Plant.** Gravity horizontal flow from influent to effluent is a feature of the Hays Process which frequently saves a city the first cost and operation cost of sewage pumping.

4. **Contact Surfaces Are Trouble-Free.** There are no filters to pond or sludge to bulk. Vertical contact surfaces unload continuously without clogging.

5. **No Dependence Upon Suspended Solids.** The contact media and biological film are always in place to do their work. There are no essential suspended solids that may be "washed out" with the effluent.

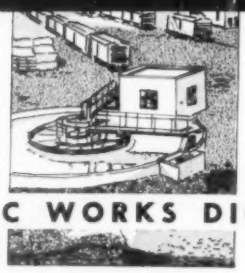
6. **Simple Odor-Free, Insect-Free Operation and Maintenance.** Because of simplicity a Contact Aeration Plant requires less attention and skill than most plants with equal treatment. Absence of odors or flies insured by proper operation simplifies location problems.

7. **Excellent Results.** The results of Contact Aeration, as indicated by removal of B.O.D. and suspended solids, compare favorably with far more costly systems.

8. **Exceptionally Low Cost.** A Contact Aeration Plant can usually be installed for substantially less initial investment than other processes.

Engineers: For new bulletin with full information, address:

HAYS PROCESS CO., P. O. Box 768 · Waco, Texas



PUBLIC WORKS DIGESTS

THE INDUSTRIAL WASTE DIGEST

Chemical Manufacturing Wastes Treatment

In preparing dilute organic wastes for discharge directly to the Delaware River immediately above the Burlington-Bristol Bridge, it is necessary that they not only be satisfactory from the standpoint of BOD but that the wastes not impart tastes or odors nor contain toxic materials. The wastes included aliphatic acids, alcohols, esters, and some inorganic salts. Among precautions taken were preventing accidental loss or spillage of chemicals within the manufacturing plant. Leaks, stuffing box losses of centrifugal pumps, and floor washings contribute heavily to waste concentration and represent substantial product losses. The waste from the plant enters a "toxicity basin" in which it is held about 15 hours. This affords an opportunity to observe whether materials are present which might be toxic to trickling filters used later in the treatment process. From these basins the waste flows to a sedimentation chamber and thence, to two trickling filters which may be operated in series or parallel. Final treatment consists of heavy chlorination. After the chlorine residual is dissipated in storage, permission is obtained from the State Regional Engineer to discharge it to a stream. The volume of waste treated averages 400 to 600 gpm. With raw waste BOD values ranging from 721 to 2,285 ppm., overall reductions as high as 99% have been achieved. Trickling filter loadings were 1.14 to 2.22 lbs. per cu. yd. per day. Sufficient nitrogen and phosphorus were available to make unnecessary the addition of any nutrient materials.

"Waste Treatment at a Large Chemical Manufacturing Plant." By J. H. Steen, F. M. Majewski, and T. Iezzi, Rohm and Haas, Bristol, Pa. *Sewage and Industrial Wastes*, July.

1955 Literature On Waste Treatment

The Committee on Research of the Federation of Sewage and Industrial Wastes Associations has reviewed and listed 311 articles dealing with industrial waste treatment which appeared during 1955, briefly abstracting many of them; also 221 articles dealing with water pollution. The articles are classified according to the wastes treated, under the heads of Canning, Dairy, Packinghouse, Fermentation industries, Pharmaceutical and Chemical, Coal, Coke Oven, Petroleum Processing, Pickling and Acid, Plating and Cyanide, Tannery, Textile, Wool Scouring, Pulp and Paper.

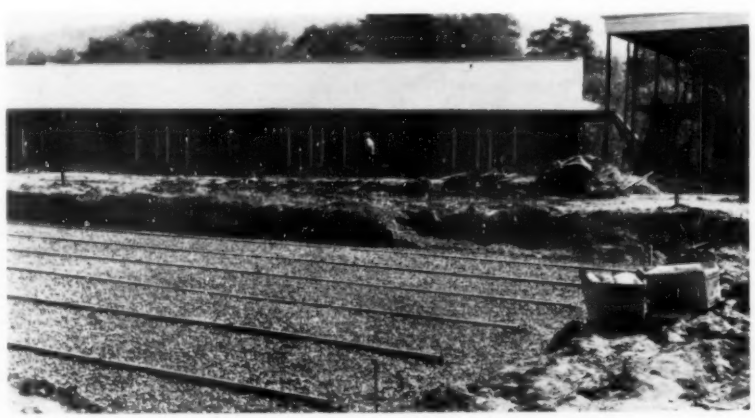
"A Critical Review of the Literature of 1955 on Sewage, Waste Treatment, and Water Pollution". *Sewage and Industrial Wastes*, June.

Bioassay Techniques for Metal Ions

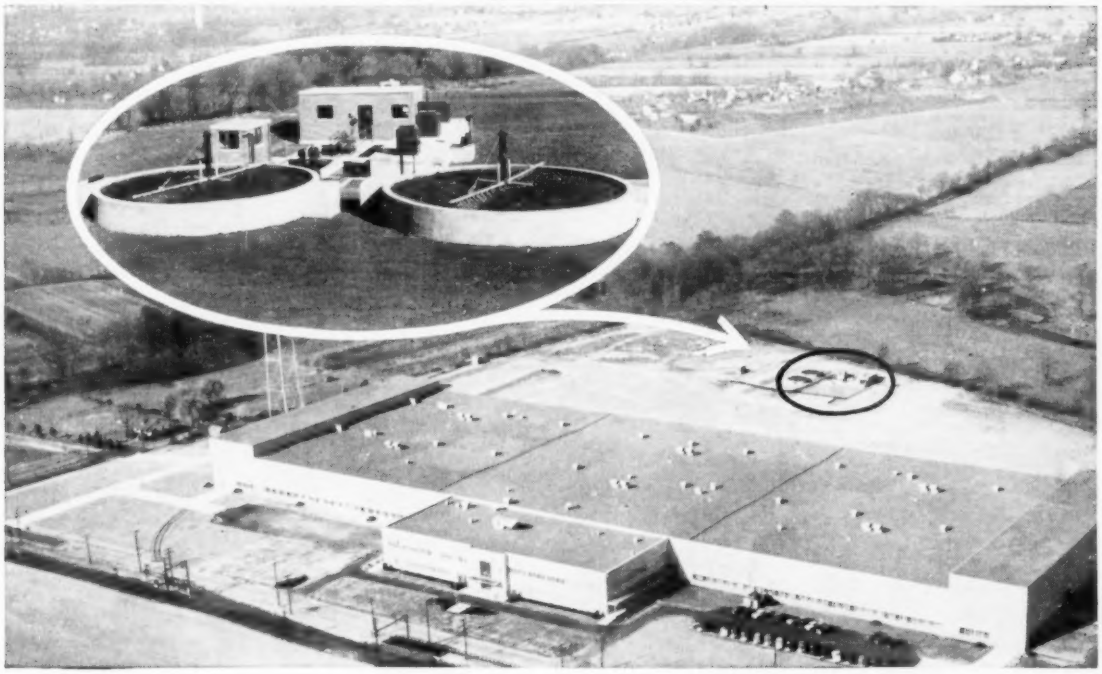
Few conventional techniques are capable of detecting metal ion concentrations at a level of 10^{-5} moles per liter, yet guppies, for example, are sensitive to such concentrations of some cations. Consequently, it appeared that bioassay techniques might be applicable for determining the presence of toxic cations at this extremely low concentration level. LD_{50}'s for various cations, including silver, mercury, copper, cadmium, lead, zinc, and nickel were determined by a method involving the preparation of progressively diluted aliquots of the unknown solution. The toxicity of the dilutions

Perforated Pipe Used in Sand Filter

SEWAGE DISPOSAL for the 92-unit West Nyack Motor Hotel located on Route 303 just North of the New York State Thruway utilizes four 1866-sq. ft. sand filters as secondary treatment for the effluent from two 2,300-gallon septic tanks. The design basis for the septic tanks was 100 gal. per unit per day. Each sand filter consists of six 56-foot distribution lines and five 56-foot underdrains of 4-in. Orangeburg Perforated Pipe. The distribution lines are laid on two inches of ¾-in. gravel with a covering of 4 inches of ¾-in. gravel; while the underdrains have a 4-inch covering of ¾-in. gravel with 1 inch underneath. After filtering through 30 inches of clean coarse sand, the effluent is gathered in the underdrains and led to a drainage ditch through a chlorine contact tank. The sewage disposal system was designed by William A. Yuda, West Nyack, N. Y., and installed by Beckerle and Brown, Inc., Pearl River, N. Y.



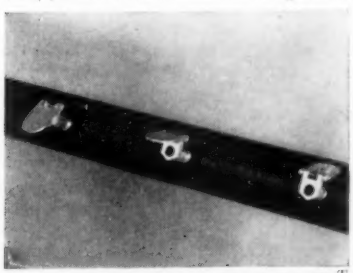
Link-Belt sewage treatment plant (inset) with PFT Rotary Distributors on 25′ filter beds.



Link-Belt chooses PFT Rotary Distributors for its own sewage treatment plant

As an important manufacturer of waste treatment equipment, the Link-Belt Company quite naturally drew upon its own fine equipment in adding sewage treatment facilities to its great modern plant in Colmar, Pa.

PFT is proud that its *Rotary Distributors* were selected for the two 25′ diameter filter beds. Working in conjunction with Link-Belt's own equipment, these Distributors have proved their efficiency in a thoroughly modern installation.



Spreader Jets for the arms of the PFT Rotary Distributor. Note various positions of the hinged deflectors which raise or lower to accommodate desired flow.

The sewage plant handles the domestic wastes of some 650 employees in addition to all the industrial wastes that respond to trickling filter treatment.

Each Distributor is designed to handle 180 g.p.m. of settled sewage. Pumped directly to the rugged center column, the sewage is then distributed through 3" diameter arms of galvanized steel. PFT Spreader Jets are carefully spaced along the arms for uniform distribution over the entire filter bed area.

A unique feature of the Spreader Jet is the hinged deflector. This design was originated by PFT and is particularly adaptable to small distributors. By hinging above the orifice (see illustration), the deflector lifts under initial head and permits maximum reactive force to bring the Distributor up to the proper rotational speed.

As the head drops to normal operating pressure, the deflector drops to a position that produces a flat, uniform spray with even distribution over the filter bed.

The circular orifices in the Spreader Jets are always open to full size. This practical design effectively reduces clogging and simplifies maintenance.

Design of plant by / Link-Belt Company Engineering Dept.

waste treatment equipment exclusively since 1893

P.F.T.

PACIFIC FLUSH TANK CO.
4241 Ravenswood Avenue
Chicago 13, Illinois

PORT CHESTER, N. Y. • SAN MATEO, CA IF. • CHARLOTTE, N. C. • JACKSONVILLE • DENVER

for the test organism is compared with the toxicity of standard solutions containing the source cation. It is thus possible to calculate the concentration in the unknown from the observed dilution factor and the concentration of the standard solution. Through this same method solubilities of a salt containing a toxic cation and a non toxic anion may be determined. In the LD_{50} determinations, 3 guppies were exposed in 2 liters of solution for a period of 24 hours. Controls containing no added ions were also run.

"Bioassay for the Estimation of Metal Ions." By W. H. R. Shaw and B. R. Lowrance, University of Texas. *Analytical Chemistry*, July.

Activated Sludge Treatment of Citrus Waste

The application of the activated sludge process to the treatment of wastes from a citrus fruit cannery was studied in a pilot plant at the Fosgate Citrus Concentrate Cooperative at Forest City, Fla. The plant consisted of a 500-gal. surge tank, an aeration tank utilizing compressed air, and a clarifier. Raw waste was pumped into the surge tank in which it was mixed with alkaline waste and diluted with water. An agitator was used in the surge tank to keep the waste from becoming septic. Nutrients, consisting of sodium nitrate and trisodium phosphate were added before the waste was discharged to the aeration tank. One of the difficulties observed was the extreme variability of the raw waste BOD concentration which seemed to be dependent primarily on the proportion of peel bin drainage. The range of variation was 2,000 to 20,000 ppm BOD. About 29% BOD reduction occurred in the surge tank, and during the last 14 days of operation, the overall BOD reduction in the waste was better than 99%. During periods of overload and poor operation, slime-forming organisms *Sphaerotilus*, became prolific. *Vorticella* seemed to be the last type of micro-organism to return to significant numbers after recovery from a severe overload.

"Pilot Plant Treatment of Citrus Waste Water by Activated Sludge." By R. R. McNary, R. W. Wolford, and M. H. Dougherty, Florida Citrus Experiment Station, Lake Alfred, Fla. *Sewage and Industrial Wastes*, July.

Meat Processing Waste Treatment

The first step in selection of a method for treatment of meat processing wastes is evaluation of waste handling within the plant—a fact-finding survey to develop an economic balance between waste prevention and waste utilization. Screening of liquid wastes is always justifiable for recovery of offal and to remove objectionable materials. Grease recovery is also generally justified. Paunch manure and blood require separate disposal or recovery. Waste treatment measures available include subsidence and flotation. Sedimentation with grease removal can reduce BOD 25 to 40 percent, more with flocculation. Septic tank treatment can provide 78.1 to 93.4 percent BOD reductions. Intermittent sand filters, dosed with sedimentation basin effluent can process the waste with loadings of 50,000 to 150,000 gals. per acre per day. Trickling filters, with a 4½ to 5 recirculation rate and application of 20 mgad can provide a 95 percent reduction in septic tank treated waste. Chemical coagulation using lime, chlorine, and ferric chloride has been applied. Anoerobic digestion is the newest treatment method, for packing house wastes, involving digestion with seed sludge at a pre-

Gorman-Rupp Contractors' Pump

KEEPS PENNA. DAM JOB MOVING

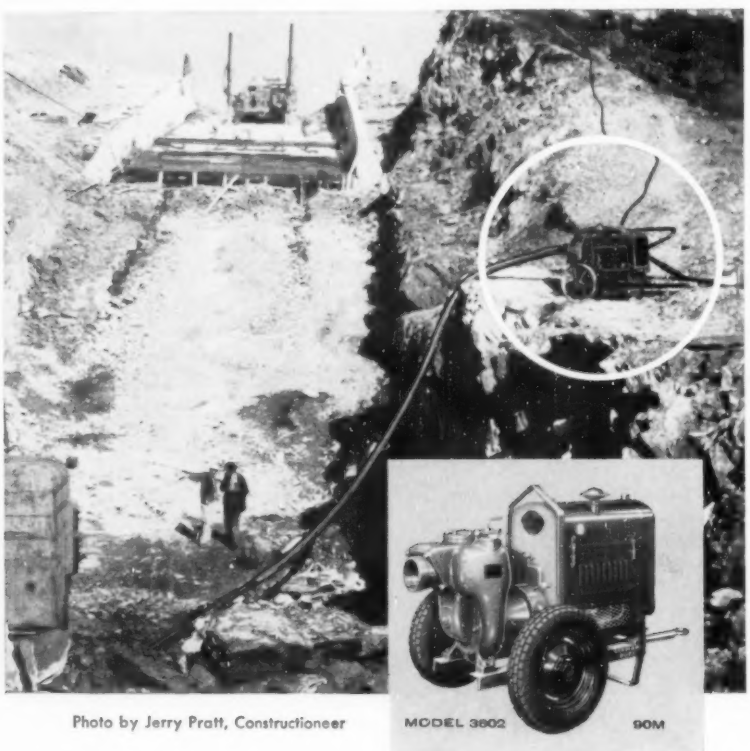


Photo by Jerry Pratt, Constructioneer

Near Spring Grove, Pennsylvania, a 1,100,000,000-gallon earth dam is being constructed for P. H. Glatfelter Co., producers of paper, by Central Pennsylvania Quarry, Stripping and Construction Co. Seepage in the spill-basin is quickly removed by a Gorman-Rupp 90M Pump, Model 3602, letting work proceed on the removal of solid rock. The pump stands about 20 feet above water level and is discharging over the rise, as shown in the upper right of the picture. The 500-ft. spillway chute handles overflow from the 2½-sq.-mile dam.

Keep *your* job moving with a Gorman-Rupp Contractors' Pump. It is guaranteed in plain language.

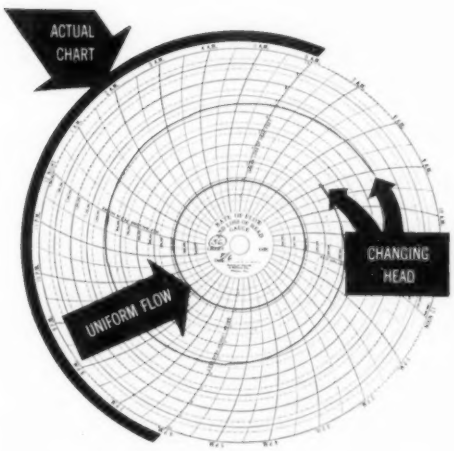
Gorman-Rupp PUMPS

THE GORMAN-RUPP COMPANY

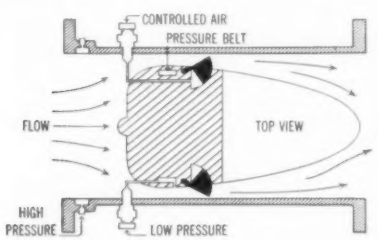
305 Bowman Street • Mansfield, Ohio

NEW SIMPLEX FILTER RATE CONTROLLER GIVES YOU COMPLETELY PNEUMATIC CONTROL!

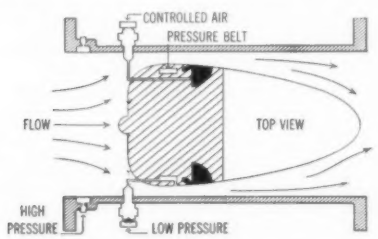
Amazing Modulair® Controller responds fast . . . closes tight



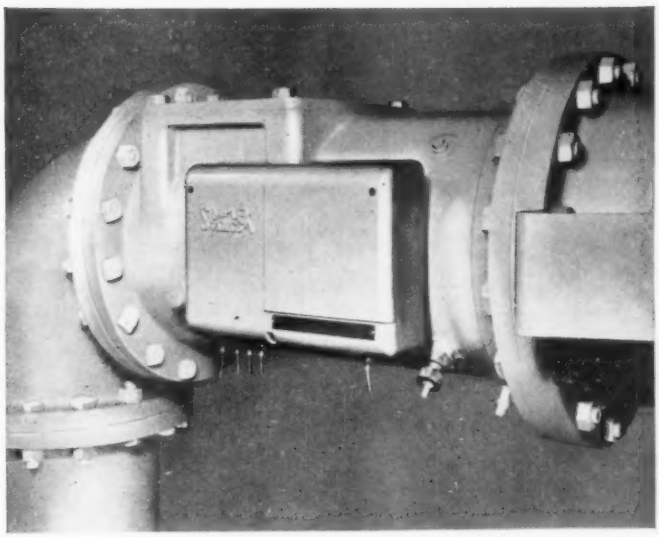
Here's proof that the new Simplex Modulair Filter Rate Controller responds instantly to changes in filter head, holds flow at desired rate . . . automatically! In chart from Modulair installation No. 2, head changes from 4′ to 7′ while rate forms almost perfect circle at the set 275,000 gpd.



How Modulair works! Pipe-like casting with annular Venturi throat houses streamlined inner body with corded-rubber modulator (black) that expands and retracts pneumatically to control flow. When head is low at start of run, modulator expands automatically to hold flow at set rate.



As filter head loss rises, flow tends to decrease . . . and change the Venturi differential. Sensitive Modulair compensates by instantly retracting the pneumatic modulator, maintaining a constant head-loss value through the combined filter and controller, automatically keeping flow at set rate!



Compact . . . easily installed Modulair is only two to three pipe diameters long! It fits wherever a piece of pipe can fit . . . in any position, horizontal or vertical . . . simplifying pipe gallery layout. High-grade, cast iron Modulair comes in 4" to 24" standard pipe sizes with corrosion-resisting fittings. Cord-inserted rubber throttling element that's as tough as a truck tire has given 30 years' wear in accelerated life-tests.

Accuracy! In 4 years of field performance, Modulair charts show an accuracy in filter control that exceeds today's most exacting demands. This high degree of control extends for wide ranges of head loss and flow rates, including complete, tight shut-off! And there's no drift at end of run.

Longer filter runs! Modulair combines a low head-loss, annular Venturi measuring element with a streamlined throttling element. This new design offers so little resistance to flow that you get longer filter runs, big savings in wash water!

Minimize maintenance! With Modulair's new design, there's no place for air to accumulate . . . no place for sand to lodge and interfere with accuracy. Throttling element, the only moving part inside pipeline, is non-corrosive rubber. Pneumatic poise element is simple, rugged. There are no line valves, no pilot valves, no pistons, no valve shafts, no stuffing boxes to pack!

Lower first cost! Modulair's low head loss means lower operating head requirements . . . permits vertical compression in plant design and lower costs in plant construction.

Completely pneumatic! No intermediate hydraulic steps! No pilot valves! No hydraulic cylinders! Air loading pressure is applied *directly* to the flow controlling element.

Automatic filter operation! Modulair works with control systems of any type to give you remote rate control or master pneumatic control that's fully automatic.

Technical bulletin! For full details on Modulair, write for Bulletin 950. Simplex Valve & Meter Company, Dept. PW-**9,** 7 East Orange Street, Lancaster, Penna.

Accurate instruments and controls for over 50 years

SIMPLEX®

VALVE AND METER COMPANY

determined temperature in a closed tank. For economy and simplicity of operation, irrigation has no equal in waste disposal: it has been applied particularly to the poultry dressing industry.

"Treating Meat Processing Wastes." A. J. Steffen, Wilson and Co., Inc., Chicago. *Public Works.* August.

Sludge Volume Control By Crystal Seeding

A major problem in neutralization of acid wastes with lime is sludge handling and disposal. As a result of preliminary observations as to the value of crystal seeding in concentrating lime sludges, experiments were conducted on a half-liter scale in which sulfuric acid solution containing various dosages of gypsum or return sludge were neutralized by addition of 10 percent lime slurry. A 6-min. reaction time was chosen, after which pH was measured and sludge settling characteristics were determined. Both quicklime and dolomitic lime were used for neutralization. In determining the effect of gypsum seeding upon sludge characteristics, acid concentrations were selected ranging from 1 to 10 percent. In evaluating the effect of acid concentration on optimum gypsum addition, it was found that a linear relationship existed between the increase of optimum gypsum dosage and an increase in acid concentration until the latter reached 5 percent. Observations of the effect of pH showed equal results at pH 4.0 and at pH 8.0 or greater. In general, it was concluded that sludge concentration is aided by adding gypsum or return sludge to the acid before neutralization; that the processes are unaffected by impurities commonly present in waste acid solutions; that the optimum sludge return dosage appears to be one to three times the weight of the calcium sulfate formed from the neutralization action; and that the resultant concentration of the sludge is dependent upon the properties of the seed crystals and the quantity added.

"Control of Sludge Volumes Following Lime Neutralization of Acid Wastes." By S. D. Faust, H. E. Orford, and W. A. Parsons, Rutgers University. *Sewage and Industrial Wastes*, July.

• • •

Air Placed Concrete Protects Culvert

CONSTRUCTING A 10-FT. multi-plate Armco corrugated pipe culvert, 331 ft. long under a 70-ft. overhead fill, is in itself a major task. Added to this was the problem of water with a pH range of 5.0 to 5.2 that would subsequently use the waterway. The culvert was built by the Maryland Highway Department on U. S. Route 40 near Cumberland, Maryland, to care for the flow of the Little Savage river.

Because of the characteristics of the water from the Little Savage, it was necessary to provide an inner lining for the culvert. The Air Placement Cement Co. of Grafton, West Virginia, lined the lower half of the culvert with air placed or gunned concrete. Because of the high density of gunned concrete, the culvert will not be affected by the water.

The first step in lining was to drill the plates forming the lower half of the culvert. Using an air drill, it was possible to drill a hole in 3 seconds. Galvanized bolts were set to act as spacers and anchoring for #10 gage galvanized welded wire fabric which was placed over the lower half of the culvert. The wire fabric was positioned ½-in. from the corrugations.

Ravaging Waters of New England Floods

Reveal Rugged Strength of

CAST IRON PIPE

On a black night in August 1955, many communities were devastated by the most disastrous flood in New England history.

In Winsted, Conn., the normally quiet Mad River ran wild. It ripped Main Street right out of the city, tearing away pavements and layers underneath to a depth of 8 to 12 feet, laying bare the vitals—the manholes, water, sewage and gas mains. One mile of 12" Cast Iron Pipe on Main Street, installed originally in 1895, and about 500 feet of Cast Iron Pipe on Lake Street, were completely exposed.

In spite of the brutal pounding of the raging waters, both lines remained intact throughout their entire length, although, in places, earth was washed out below them to a depth of several feet.

During this flood catastrophe, Cast Iron Pipe showed once again, in city after city, its remarkable toughness and rugged strength—two qualities that have helped make it known as "America's No. 1 Tax Saver".

★ ★ ★ ★ ★

Our Company does not manufacture pipe but has long supplied the nation's leading pipe manufacturers with quality iron from which pipe is made.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Allis-Chalmers

invites you to visit Booth B-4 at the 1956 American Public Works Congress

See the cost-cutting HD-6G tractor shovel at the Fort Worth exhibit—ask about its many municipal uses. And while you're there, be sure to see the Allis-Chalmers HD-11G actually at work on Fort Worth's sanitary landfill operation.

Public officials with limited budgets are looking for improved equipment and better methods in order to provide taxpayers with full measure in community services and conveniences. That's why progressive leaders of villages, townships, counties, and cities have adopted new, high-speed methods of doing traditional jobs with modern high-production, multi-purpose equipment.

Allis-Chalmers is proud to be able to help community planners and builders by offering a wide variety of such cost-cutting equipment for public work, including these outstanding machines:

HD-6G and HD-11G TRACTOR SHOVELS
Versatility and stamina of heavy-duty units at low cost. Ideal for sanitary landfill. HD-6G develops 55 belt hp, weighs 19,600 lb with 1½-yd bucket. HD-11G develops 100 belt hp, weighs 32,000 lb with 2¼-yd bucket.

MODEL D MOTOR GRADER
Costs less than one-third the price of a large machine. Rear-end loader, scarifier, and other attachments add to usefulness. With 50-hp gasoline engine, 8,800 lb; with 50-hp diesel engine, 19,350 lb.

Get all the facts from your Allis-Chalmers construction machinery dealer

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WIS.

ALLIS-CHALMERS

MOTOR GRADERS	TRACTOR SHOVELS	CRAWLER TRACTORS	MOTOR SCRAPERS	PULL SCRAPERS	WHEEL TRACTORS
50 to 120 hp	1½ to 4-yd capacities	50 belt hp to 204 net engine hp 12,000 to 44,000 lb	14 and 20-yd heaped capacity	4.7 to 20-yd heaped capacity	22.87 to 45.27 belt hp

SOIL MOVER Moves 100 to 150 Cu. Yds. per Hour!

Long a favorite with farmers, contractors, SOIL MOVER is ideal for road work and land fill. *Actually moves dirt for as little as 4½¢ per cu. yd.!* Hydraulically operated from tractor seat. Front pick-up, rear dump. Spreads or dumps load. Double acting cylinders. Soil Mover models available for 25 to 50 HP wheel tractors or small crawler tractors. Built to L-A-S-T, it's World's No. 1 Scraper—yet costs $100s less than comparable road-building equipment!

WRITE for free literature, prices, and name of nearest dealer.

The SOIL MOVER CO., Dept. PW-9, Columbus, Nebr.

Convention in Philadelphia
Air Conditioned Meeting Rooms

FREE!
when sleeping rooms are used . . .

City's most convenient hotel.
400 modern, attractive rooms — all with Private Bath, Radio, and Circulating Ice Water.
Finest Convention Facilities — Entire Floor of Air-Conditioned Meeting Rooms.
Reserve Direct or through your Travel Agent.

Teletype: PH 683
Telephone: Rittenhouse 6-3000
RATES: from $5.50 Single $8.50 Double
Frank Moss, Gen. Mgr.
Melvin I. Dalrymple, Mgr.

For Wining and Dining—
Adelphia Room
Coffee Shop
Adelphia
Cocktail Lounge

ADELPHIA Hotel
CHESTNUT STREET AT 13th

After the wire mesh had been placed and secured in position, 3½ inches of concrete was gunned into place using a Model 1250 Airplaco Bondactor. The Bondactor and the air compressor were located at the end of the culvert, the material hose, air and water lines being run into the pipe.

Though there is no known mine drainage into the river, there is some acid which can be attributed generally to woodland litter.

• • •

A Civil Defense Center

An underground civil defense control center is being constructed in Portland, Oregon, to serve as the municipal operations center in times of disaster or enemy attack. The $500,000 building, located about three miles from the center of the city, is covered by an 84-foot, 26-inch thick concrete arched roof. The control center is a completely self-contained unit which will house 300 people for a week with no one entering or leaving.

• • •

Record Snow At Cayuse Pass

The heaviest snow pack ever recorded in the State of Washington was measured April 1 at Cayuse Pass. The United States Geological Survey office in Tacoma reported a snow measurement at that point, between Mount Rainier and Chinook Pass, of 329 inches, with a 150-inch water content. This year's snow pack was 50 percent above normal, and 10 percent above previous records at most measurement points.

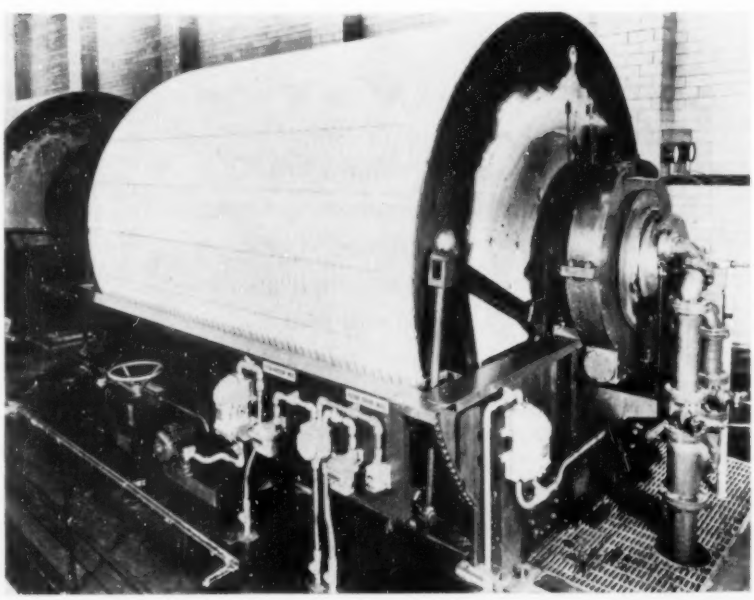
Sewage Plant Extension

(*Continued from page* 129)

time. The sludge is conditioned with ferric chloride and lime before filtration. The dewatered sludge is incinerated.

High filtration rates, according to F. H. Burley, Engineer of Sewage Treatment, have been maintained. Typical chemical dosage figures are 0.95 percent ferric chloride and 8.79 percent lime, the latter added as cheap water carbide lime rather than the more expensive pebble lime to save ferric chloride. When the sludge is easy to filter, as in time of storm flow, filters are sometimes operated with lime only. Detroit has a combined sewerage system; all rain water, as well as domestic and industrial wastes, drain into the sewers. Thus, during rainy weather, a 12 percent sludge can be filtered with lime only (over 9 percent), primarily because of the sand brought in by the rain water.

Space was allotted in the original plant layout for future expansion of the incinerator building; but the two additional incinerators for which floor space was planned are not yet needed as the four incinerators now in use can handle present requirements.



● **NEW FILTERS were made similar in design to original units to reduce maintenance costs, but a water spray was added to clean the filter cloth during operation.**

SAFETY Sells SeweRodeR at Mechanicsburg, Pa.

The SeweRodeR's ability to rod 3,000 to 4,000 feet of sewers per day at a cost of .03 cents per foot naturally impressed Mechanicsburg – but, the "Sale Clincher," was *greater worker safety.*

Rods are self-contained in the SeweRodeR and once the set-up is made, are carried to the sewer pipe inside a guide tube. Operators never touch rods during cleaning operations. Since guide tube is lowered into manhole from street level, 99% of bottom of manhole work is eliminated, with corresponding reduction in exposure to manhole hazards.

FLEXIBLE INC.
3786 Durango Ave., Los Angeles 34, Calif.
(Distributors in Principal Cities)

Flexible representatives will be glad to give you full performance details, or arrange for a demonstration in your city.

BAUGHMAN SAND and CINDER SPREADER

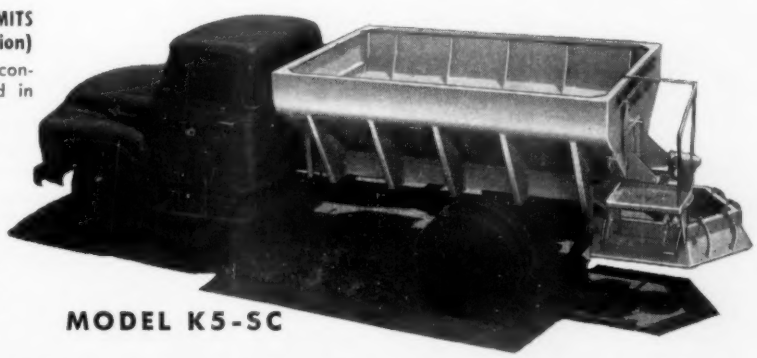
SAFETY CHAMPION FOR STREETS AND HIGHWAYS
choice of 4 drives

PTO with { Mechanical Operation / Hydraulic Operation

Auxiliary Engine with { Mechanical Operation / Hydraulic Operation

CAB CONTROLLED VACUUM CLUTCH PERMITS SPOT SPREADING (on mechanical operation)
Completely sealed, vacuum operation, controlled from cab. Start or stop spread in motion, as at intersections, safety zones. On hydraulic operation models, spot spreading is controlled by by-pass valve.

TWO-SPEED "QUICK CHANGE" MECHANISM
Simple sprocket and chain drive: low for chemical spreading, high for large-volume spreading. No need for expensive automotive transmission. On hydraulic opetation models, spreading volume is valve controlled.



MODEL K5-SC

WRITE FOR NEW ICE CONTROL CATALOG!

BAUGHMAN

BAUGHMAN MANUFACTURING COMPANY

224 ARCH STREET • JERSEYVILLE, ILL.

Fast Digging for Hydrant Placement

● SETTING a fire hydrant for the City of Dearborn, Michigan. Water department workers are shown here using a Sherman Major power digger attached to a Fordson Major tractor to excavate the hole and expose a 12-inch pipe. The backhoe-loader combination is used also for digging service lines and other jobs.

Temporary Traffic Signal Used by the City of San Diego

THE PROBLEM of providing quick restoration of operation of traffic signals has been accentuated with the use of fabricated steel standards in place of the cast iron traffic signal standards formerly used. Cast iron standards when hit, generally sheared off clean where the flange intersected the bottom of the shaft, without disturbing the concrete foundation. Fabricated steel standards, being of tougher material, have a tendency to dislodge the foundation and, when this happens, it takes several days to break up and remove the displaced foundation, pour a new one and reinstall a new standard so that normal service can be resumed.

In order that service to the affected location might be restored promptly, King W. Hardy, Traffic Signal Technician in the Electrical Division of the Department of Public Works of the City of San Diego, suggested the use of a temporary, home-made traffic signal. This signal, shown in the accompanying illustration, has for the base an old brake drum salvaged from one of the City trucks, to which is welded a 1½" standard galvanized conduit which is threaded directly into the traffic signal head. The conductors to the signal lights were fished down through the 1½" conduit and out through a hole in the brake drum and are spliced temporarily to the existing underground conductors at the affected location. A barricade is set at the standard, as shown in the illustration, to provide added rigidity. The overall height of the standard was made approximately ten feet as we wanted it as high as possible, yet capable of being stored for instant use in the Electric Shop, which has a 10′ 6″ ceiling. The overall weight of this temporary signal is approximately eighty pounds and can be handled by one technician. We also have a four-light head which can be substituted on this standard where it is necessary to have an additional indication for a left turn arrow.

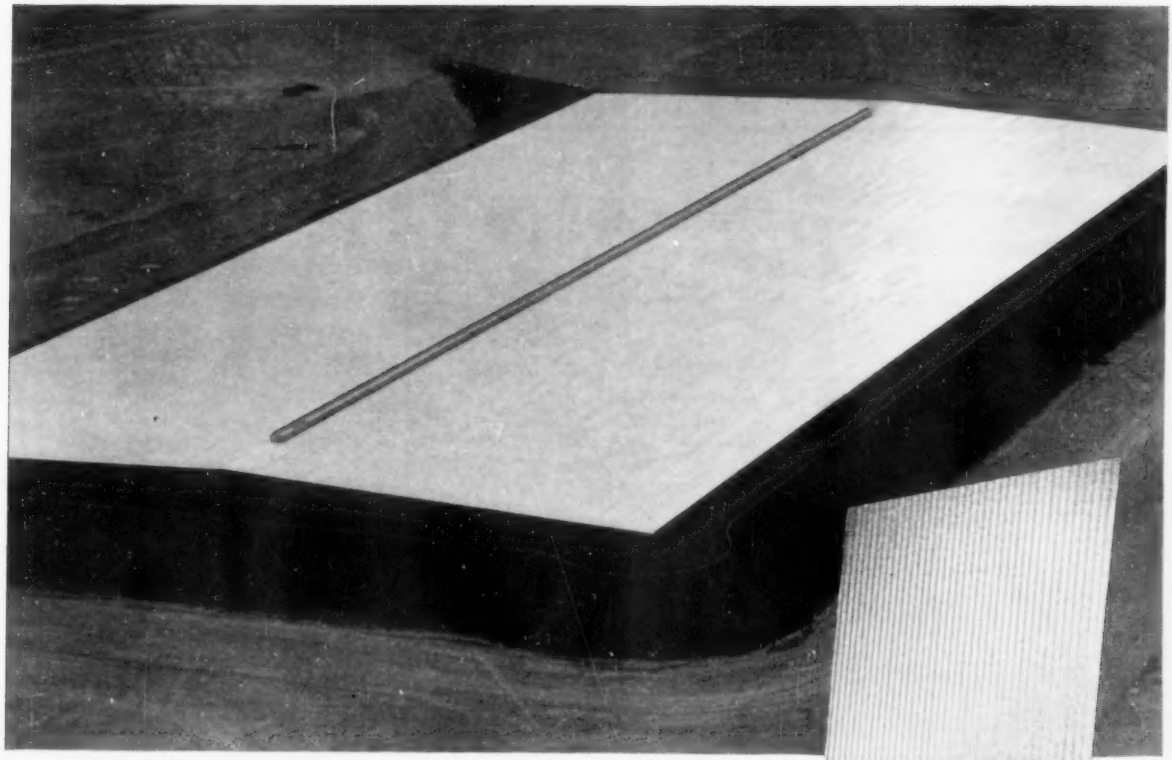
This signal is capable of being used on any existing installation whether it be two-phase, three-phase, traffic actuated, non-traffic actuated, or interconnected; except if the pole with the dispatcher is knocked over. It is estimated that this is about a one-to-five chance. The advantages of this temporary signal over a battery operated job are that it can be used in conjunction with the existing signals as noted above, which will generally provide better traffic flow, that it has more height and is thus more easily seen, and that there are no batteries to be recharged.

● WHEN a traffic signal standard has been damaged, this portable unit is used until new signal is in place.

How to Stop Caking in Bulk Salt Storage

BULK STORAGE of rock salt without danger of caking is now possible through the use of Sterling Storite, according to a recent announcement of the International Salt Company. The pictures on page 214 show Sterling Storite in action. At first, the fine whitish powder is not noticeable when applied to the rock salt, but a few hours later, a sulfur-colored mossy efflorescence covers the rock salt crystals. It is this mossy growth which keeps Storite-treated sale from cementing into a hard mass.

Caking in untreated rock salt is caused by the formation of a microcrystalline bond or bridge of salt which crystallizes out of the surface film of saturated brine at the points of contact of the grains. It is possible to alter the normal habit of various crystalline substances by adding modifying chemicals before the crystal starts to form. In the case of salt, the cubic habit is changed to a dendritic habit by use of merely trace quantities of Sterling Storite. The dendritic shape of rock salt might be compared to the skeleton of a cube without the balance of the cube being filled in. Because this



Rays from the hot summer sun are reflected by this tremendous reservoir cover made of Kaiser Aluminum, keeping the stored water cool. Prime contractor for the cover was Lembke-Clough and King of Las Vegas. Aluminum was supplied by Taylor Steel Co., Las Vegas.

Five acres of rust-proof Kaiser Aluminum keep Las Vegas water cool and pure

30,000,000 GALLONS of water in the Las Vegas Water District reservoir are now protected by a cover of Kaiser Aluminum Roofing.

This roofing reflects rays from the hot summer sun . . . keeps stored water cool to reduce evaporation loss. Cool water means a substantial reduction in the growth of algae, and this in turn cuts down the amount of chemical treatment necessary.

Another outstanding advantage is the fact that these Kaiser Aluminum roofing sheets will never rust, never need painting or expensive maintenance of any kind.

Strong, lightweight Kaiser Aluminum roofing is the perfect material for public works construction, or for industrial and commercial buildings. The big sheets are easy to handle and permit lighter, less expensive supporting structure.

For A.I.A. File and more complete information on Kaiser Aluminum industrial building products, contact any Kaiser Aluminum sales office. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

see our catalog in SWEET'S PRODUCT DESIGN FILE or write for copy

Kaiser Aluminum

Industrial Building Products

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

modern GIVES YOU SO MUCH more...

in

swimming pool supplies!

FREE Complete data, photos and prices on entire line of equipment and supplies for new and existing pools. Facts on pool care and maintenance. Ask for Catalog No. 13-W.

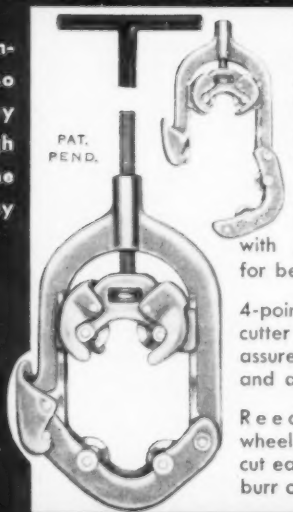
more know-how ... more dependability ... more value

Modern, leading manufacturer of swimming pool supplies since 1935, makes over 100 top-quality products including filters, fittings, pool paint, vacuum cleaners, algae preventives—everything needed to build and maintain any pool. Modern offers more know-how, greater dependability, more help from an ever-growing staff. Huge stocks and regional warehouses assure fast shipment. Low prices save you money. Good reasons why so many pool owners and operators look to Modern for every pool requirement.

modern SWIMMING POOL CO., INC.
One Holland Avenue, White Plains, N. Y.

IF YOU CUT LARGE DIAMETER PIPE ...
YOU NEED THESE
New REED HINGED 4-WHEEL PIPE CUTTERS
Four sizes cover the range from 2½" to 12"

Users tell us these completely new cutters are so efficient they often "pay for themselves" through the savings in crew time on a half-dozen cuts. They are the first really practical tools for cutting off steel or cast iron pipe in sizes from 2½" to 12". You can, for example, cut 8" steel pipe completely off in less than five minutes.



Four wheel design requires minimum swing of handle—less digging in ditch work, easier "tight-corner" cuts.

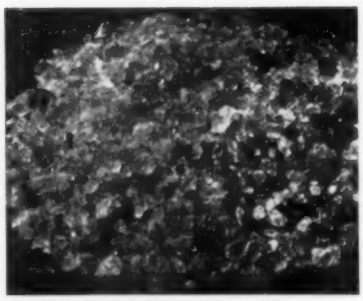
Closed frame permits light weight with complete rigidity for better cutting.

4-point guide aligns the cutter on the pipe ... assures perfect tracking and a right angle cut.

Reed Razor Blade wheels track perfectly, cut easily and roll down burr on steel pipe.

Unconditionally guaranteed to be the most efficient cutter you have ever used. Ask your jobber or write for literature.

REED MANUFACTURING COMPANY
ERIE, PENNSYLVANIA • U. S. A.



● **ROCK SALT treated with Storite, shown in top picture, soon is covered by a mossy growth as shown below.**

dendritic structure is extremely fragile, the bond between rock salt crystals has no cementing strength.

Only two pounds of Storite is used to treat each ton of rock salt, a ratio of 1:1,000. For storage in piles which are covered, the modifying chemical must be evenly distributed throughout the salt, but for outside storage it has been found that if the surface is protected against caking, the interior of the pile will remain uncaked even when wet. The best method of applying Storite to outside salt piles is to build the entire pile at once and then to apply all the Storite to the outside surface, with most of the application at the peak of the pile. In effect, the amount of Storite applied at any point on the surface should be roughly proportional to the depth of salt at that point.

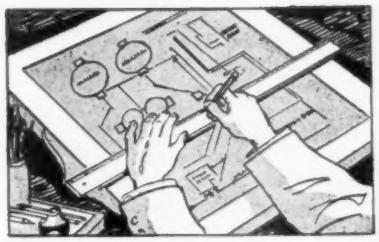
Storite is shipped in 50-pound drums, and may be applied directly or first mixed with salt in a 1 to 5 ratio.

● ● ●

Garbage Collection for Los Angeles Harbor

A garbage collection boat patrols the port of Los Angeles, making the rounds of the 20 miles of waterfront three times a week. It picks up garbage and trash from deep-water strips that are anchored in the harbor or at the docks for loading or unloading. Disposal is by dumping far out in the ocean.

CONSULTING ENGINEERS



CITY, COUNTY AND STATE

Abrams Aerial Survey Corporation
Photogrammetric Engineers

PLAN & TOPO MAPS AND MOSAICS
FROM AERIAL PHOTOGRAPHY
For Government and Industry

IVanhoe 4-9441 Lansing, Michigan

AERO SERVICE CORPORATION
Aerial topographic maps—photo-maps for engineering projects anywhere in the world—highways, railroads, cities, power and pipe lines, mining development. Soil studies and electronic surveys of large areas; resources inventories.

210 E. Courtland Philadelphia 20

ALBRIGHT & FRIEL INC.
Consulting Engineers

Water, Sewage, Industrial Wastes and Incineration Problems
City Planning, Highways, Bridges and Airports
Dams, Flood Control, Industrial Buildings
Investigations, Reports, Appraisals and Rates
Laboratory For Chemical & Bacteriological Analyses
Complete Service on Design and Supervision of Construction

THREE PENN CENTER PLAZA
PHILADELPHIA 2, PENNSYLVANIA

ALVORD, BURDICK & HOWSON
Engineers

Water Works, Water Purification, Flood Relief, Sewage, Sewage Disposal, Drainage Appraisals, Power Generation

20 No. Wacker Dr. Chicago 6, Ill.

MICHAEL BAKER, JR., INC.
THE Baker Engineers

Civil Engineers, Planners, and Surveyors
Airports, Highways, Sewage Disposal Systems, Water Works Design and Operation—City Planning—Municipal Engineering—All types of Surveys

Home Office: Rochester, Pa.
Branch Offices:
Jackson, Miss. Harrisburg, Pa.

BANISTER ENGINEERING CO.
Consulting Engineers

POWER PLANTS, WATERWORKS, CITY PLANNING, RURAL ELECTRIFICATION, SANITATION, WASTE PROBLEMS, AIRPORTS, STREET IMPROVEMENTS

1549 University Ave.
St. Paul 4, Minn.

BARKER & WHEELER
Engineers

Water Supply, Sewerage, Sewage Disposal, Power, Public Utility and Industrial Valuations and Rates

36 State Street, Albany 7, N. Y.
11 Park Place, New York City 7

E. D. BARSTOW & ASSOCIATES
Engineers

Water Supply, Treatment, Distribution
Sewage Collection, Treatment, Disposal
Trade Waste Treatment

163 N. Union St. Akron 4, Ohio

HOWARD K. BELL
Consulting Engineers

G. S. Bell C. G. Gaither J. K. Latham
J. W. Finney, Jr., Assoc.

Water Works — Sewage Disposal
Water Purification — Sewerage
Swimming Pools — Refuse Disposal
Industrial Wastes

553 S. Limestone St. Lexington, Ky.

BLACK & VEATCH
Consulting Engineers

Water—Sewage—Electricity—Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates

4706 Broadway Kansas City 2, Missouri

AIR SURVEY CORPORATION
Photogrammetric Engineering

1101 LEE HIGHWAY, ARLINGTON 9, VIRGINIA

Precise Topographic and Planimetric Maps
Tax Maps and Atlas Sheets
Controlled Photo Maps
Route and Location Surveys
Field Surveys
Aerial Photography

ALSTER & ASSOCIATES, INC.
AERIAL SURVEYS

TOPOGRAPHIC • PLANIMETRIC • MOSAIC MAPS

cuts your mapping costs

Write for free brochure on mapping and aerial photography.

6135 Kansas Ave., N.E., Washington 11, D.C. TA 9-1167

BOGERT AND CHILDS
Consulting Engineers

Clinton L. Bogert — Fred S. Childs
Ivan L. Bogert — Donald M. Ditmars
Robert A. Lincoln — Charles A. Manganaro
William Martin

Water & Sewage Works — Refuse Disposal
Drainage — Flood Control
Highways and Bridges — Airfields

145 East 32nd Street, New York 16, N. Y.

BOWE, ALBERTSON & ASSOCIATES
Engineers

Sewage and Water Works
Industrial Wastes — Refuse Disposal — Municipal Projects
Industrial Buildings — Reports
Plans — Specifications
Supervision of Construction and Operation — Valuations
Laboratory Service

75 West Street, New York 6, N.Y.

FLOYD G. BROWNE AND ASSOCIATES
Consulting Engineers

F. G. Browne, J. R. Patterson, S. W. Kuhner
R. D. Seidel, G. M. Hinkamp, W. G. Smiley
Water Supply and Purification; Sewage and Industrial Waste Treatment; Refuse Disposal, Power Generation and Electric Systems; Surveys; Reports; Valuations and Rates.

Marion, Ohio

BROWN ENGINEERING CO.
Consulting Engineers

Waterworks, Sewage Disposal, Airports
Street Improvements, Power Plants
Electric Distribution, Rates

K. P. BUILDING DES MOINES, IOWA

BROWN & BLAUVELT
Consulting Engineers

Railroads — Water Supply
Highways — Sewage Disposal
Bridges — Industrial Plants
Airports — River Developments

Telephone: Lexington 2-7581

468 Fourth Ave., New York 16, N.Y.

BUCHART ENGINEERING CORP.
Engineers

Highways—Bridges—Toll Roads
Sewerage—Industrial Waste and Disposal—Water Works—Surveys—Reports—Design—Supervision—Consultation—Industrial—Municipal—Structures

611 West Market Street York, Pennsylvania

BUCK, SEIFERT AND JOST
Consulting Engineers

Water Supply Sewage Disposal
Hydraulic Developments
Reports, Investigations, Valuations
Rates, Design, Construction, Operation
Management, Chemical and Biological Laboratories

112 East 19th St. New York City

BURGESS & NIPLE
Consulting Engineers
Established 1908
Water supply, treatment and distribution
Sewage and industrial wastes disposal
Investigations, reports, appraisals, rates
Airport, Municipal Engineering, Supervision
2015 West Fifth Ave. Columbus 12, Ohio

RALPH H. BURKE, INC.
Consulting Engineers
Traffic Studies Underground Garages
Parking Structures Grade Separations
Expressways, Airports and Terminal Buildings
Shore Protection Municipal Engineering
Parks Field Houses Swimming Pools
20 North Wacker Drive, Chicago 6, Ill.

BURNS & McDONNELL
Consulting and Designing Engineers
Kansas City 2, Mo. Telephone
P.O. Box 7088 DElmar 4375

JAMES M. CAIRD
Assoc. Am. Soc. C. E.
Chemist and Bacteriologist
Water Analysis and Tests of Filter Plants
Office and Laboratory
Cannon Bldg., Broadway & 2nd St.
Troy, N.Y.

CAMP, DRESSER & McKEE
Consulting Engineers
Water Works and Water Treatment
Sewerage and Sewage Treatment
Municipal and Industrial Wastes
Investigations and Reports
Design and Supervision
Research and Development
Flood Control
6 Beacon St. Boston 8, Mass.

CAPITOL ENGINEERING CORP.
Engineers—Constructors
Management
Water Works Sewage Systems
Design and Surveys Roads and Streets
Planning Airports
Bridges Dams
Executive Offices
DILLSBURG, PENNSYLVANIA

FOR RATES FOR THIS SPACE
Write
PUBLIC WORKS MAGAZINE
200 So. Broad St., Ridgewood, N. J.

THE CHESTER ENGINEERS
Water Supply and Purification
Sewage and Industrial Waste Treatment
Power Plants—Incineration—Gas Systems
Valuations—Rates—Management
Laboratory—City Planning
601 Swismon Street, Pittsburgh 12, Penna.

CHAS. W. COLE & SON
Engineers—Architects
Sewerage, Water Supply, Bridges,
Highways, Toll Roads, Industrial, Municipal and Commercial Buildings
220 W. LaSalle Ave., Central 4-0127
South Bend, Indiana

CONSOER, TOWNSEND & ASSOCIATES
Water Supply — Sewage — Flood Control & Drainage — Bridges — Express Highways — Paving — Power Plants — Appraisals — Reports — Traffic Studies — Airports
Gas & Electric Transmission Lines
360 East Grand Ave.
Chicago 11, Ill.

COTTON, PIERCE, STREANDER, INC.
Associated Engineering Consultants
132 Nassau Street, New York 7, N.Y.
1405 W. Erie Avenue, Phila. 40, Pa.
6 Beacon St., Boston 8, Mass.
55 Carolina Rd., Gowanda, N.Y.
Water Supply, Treatment, Distribution—Sewage, Sewage Treatment, Refuse Disposal, Air Pollution, Power Plants, Incinerator Plants, Reports, Plans, Supervision—Laboratory Service.

C. J. D'AMATO & ASSOCIATES
Consulting Engineers and Architects
Water Supply Sewerage Drainage
Structural & Foundation Problems
Dams & Flood Control
Investigations Reports Valuations
Designs Engineering Supervision
Fire Protection Public Safety
50 BEACON STREET BOSTON

DE LEUW, CATHER & COMPANY
Consulting Engineers
Public Transit, Traffic and Parking Problems
Railroads Grade Separations
Major Thoroughfares Expressways
Subways Tunnels
Power Plants Municipal Works
150 North Wacker Drive, Chicago 6, Ill.
79 McAllister St., San Francisco 2, Calif.

FAY, SPOFFORD & THORNDIKE, INC.
Engineers
Airports — Turnpikes — Bridges
Industrial Buildings — Port Developments
Drainage — Water Supply — Sewerage
Investigations — Valuations — Reports
Designs — Supervision of Construction
11 Beacon Street, Boston, Mass.

FINKBEINER, PETTIS & STROUT
Carleton S. Finkbeiner Chas. E. Pettis
Harold E. Strout
Consulting Engineers
Reports — Designs — Supervision
Water Supply, Water Treatment, Sewerage, Sewage Treatment, Wastes Treatment, Valuations & Appraisals
518 Jefferson Ave. Toledo 4, Ohio

FRIDY, GAUKER, TRUSCOTT & FRIDY, INC.
Architects & Engineers
Hospitals, Schools, Industrial Buildings, Public Buildings, Airports, Roads, Water, Sewage, Petroleum Facilities, Waste Disposal, Power & Lighting, Reports, Plans, Supervision, Appraisals.
1321 Arch Street Philadelphia 7, Penna.

GRAHAM PARKING ENGINEERS
Designing Consulting
Off Street Parking
2140 MONTCALM P.O. Box 5826 INDIANAPOLIS, INDIANA

Two-Way Radio in County Engineering

(Continued from page 136)

Another experience happened about two days after we went on the air in July, 1954. A combine in a wheat field caught fire and the fire quickly spread to the stubble and straw in the field. A strong wind was blowing at the time toward a large barn and some other buildings. Just as all this was happening our road superintendent, O. L. Spain, was driving by in his station wagon. He saw the situation and called our office on his radio. This call was relayed by telephone to the fire department. The buildings were saved by the fire department which gained several minutes by not having to wait for the call to come in over rural telephone lines. An experience of this kind may never happen again but it is just one case of radio getting the desired equipment to the right place a little quicker.

There are many questions from men in the field every day. Sometimes a crew finds that they need additional equipment. This can be sent out to the field with a minimum of delay. Sometimes a foreman has a question on department policy. Sometimes he wants an engineer to give him line and grade stakes. Sometimes he finds culvert or bridge conditions which he thinks should be investigated by an engineer. A great many of these questions can be answered immediately. Others are referred to the proper people who will make their investigations quicker than before the days of radio.

Bridge Work

Our bridge crew uses radio to call for materials such as ready-mix concrete. The foreman can tell when he will be ready for concrete; our office checks with the ready-mix plant. The foreman is then advised when he can expect delivery. Radio has expedited our bridge repair program — especially when ready-mix concrete is used. There is less lost time waiting for concrete. The foreman can schedule his work better when he knows exactly when deliveries will be made.

It is not often that radio proves to be very spectacular; it just works for you every day, speeding up all of your operations. You have a closer knit organization which gives you better control over all of your operations. If an emergency requires it, your whole outfit can be shifted

GANNETT FLEMING CORDDRY & CARPENTER, Inc.

Engineers

Water Works, Sewage, Industrial Wastes & Garbage Disposal
Roads, Airports, Bridges & Flood Control
Traffic and Parking, Appraisals, Investigations & Reports

Pittsburgh, Pa. — Philadelphia, Pa.
Daytona Beach, Fla. — Pleasantville, N. J.
HARRISBURG, PENNA.

GRAY and OSBORNE

Consulting Engineers

Specializing In
Municipal Utilities — Design
Feasibility — Valuations — Rate
Studies — Master Planning

228 South 2nd St. — Yakima, Washington

Earth Dam Designs by GREER ENGINEERING ASSOCIATES

Site Investigations and Studies — Foundation Designs and Analyses — Airphoto Soils and Geological Mapping — Undisturbed Sample Borings — Field and Laboratory Soil Tests — Geological Studies — Supervision of Earth Fills.

98 Greenwood Ave. — Montclair, New Jersey

GILBERT ASSOCIATES, Inc.

Engineers and Consultants

Power Plant Engineering
Water Supply and Purification
Sewage and Industrial Waste Treatment
Chemical Laboratory Service

New York — READING, PA. — Washington

FOR RATES FOR THIS SPACE

write

PUBLIC WORKS MAGAZINE

200 So. Broad St., Ridgewood, N. J.

GREELEY & HANSEN

Engineers

Water Supply, Water Purification
Sewerage, Sewage Treatment
Flood Control, Drainage, Refuse Disposal

220 S. State Street, Chicago 4

HOWARD R. GREEN CO.

Consulting Engineers

DESIGN AND SUPERVISION OF MUNICIPAL DEVELOPMENTS
Water Works and Treatment—Sewers and Sewage Disposal—Investigations and Valuations

208-10 Bever Bldg., Cedar Rapids, Iowa
Established 1913

Frank E. Harley and Associates

Consulting Engineers

Water Supply and Purification
Sewerage and Sewage Treatment
Industrial Wastes and Garbage Disposal
Municipal Improvements, Town Planning
Surveys
Design, Supervision and Operation

260 Godwin Avenue — Wyckoff, N. J.

HAVENS AND EMERSON

W. L. Havens — A. A. Burger
J. W. Avery — H. H. Moseley
F. S. Palocsay — E. S. Ordway
Frank C. Tolles, Consultant

Consulting Engineers

Water, Sewerage, Garbage, Industrial Wastes, Valuations—Laboratories

Leader Bldg. — Woolworth Bldg.
Cleveland 14, O. — New York 7, N.Y.

HAZEN AND SAWYER

Engineers

Water and Sewage Works
Industrial Waste Disposal
Drainage and Flood Control
Reports, Design, Supervision of Construction and Operation
Appraisals and Rates

122 East 42nd St. — 3333 Book Tower
New York 17, N.Y. — Detroit 26, Mich.

HENNINGSON, DURHAM & RICHARDSON, INC.

Consulting Engineers

Consulting Engineers since 1917 for more than 700 cities and towns.
Water Works, Light and Power, Sewerage, Paving, Airports, Reports, Appraisals, Drainage.

2962 Harney St. — Omaha 2, Nebr.

HILL & HILL

Engineers

Sewage and Waste Disposal,
Water Supply and Filtration,
Dams, Reservoirs, Tunnels,
Airport and Topographic Surveys

Home Office: 8 Gibson St., North East, Pa.

MARK HURD AERIAL SURVEYS, INC.

Topographic And Planimetric Maps
Tax Maps *Aerial Photography*

230 Oak Grove Street — Minneapolis 3, Minn.

JONES, HENRY & WILLIAMS

Consulting Sanitary Engineers

Water Works
Sewerage and Treatment
Waste Disposal

Security Bldg. — Toledo 4, Ohio

Engineering Office of CLYDE C. KENNEDY

- Water Supply
- Sewage and Waste Treatment
- Sewage Reclamation

CHEMICAL and BIOLOGICAL LABORATORY
SAN FRANCISCO

MORRIS KNOWLES INC.

Engineers

Water Supply and Purification, Sewage and Sewerage Disposal, Industrial Waste, Valuations, Laboratory, City Planning

1317 Park Building, Pittsburgh 22, Pa.

HAROLD M. LEWIS

Consulting Engineer—City Planner

Analyses of urban problems, master plans, zoning, parking, airports, subdivisions, redevelopment. Reports—plans—ordinances

15 Park Row — New York 38, N. Y.

WM. S. LOZIER CO.

Consulting Sanitary Engineers

Sewerage, Sewage Disposal, Water Supply, Water Purification, Refuse Disposal

10 Gibbs Street — Rochester 4, N. Y.

GEORGE B. MEBUS, INC.

Consulting Engineers

Sewerage — Industrial Wastes
Water Supply — City Planning
Investigations and Reports
Design and Supervision of Construction
Valuations

Broad Street Trust Co. Bldg.
Glenside, Pa.

MERRITT & WELKER

Engineers

Water, Sewage, Streets, Roads, Natural Gas, Valuations, Municipal Planning

208 Roswell Street — Marietta, Georgia

METCALF & EDDY

Engineers

Water, Sewage, Drainage, Refuse and Industrial Wastes Problems
Airports — Valuations
Laboratory

Statler Building
Boston 16

BOYD E. PHELPS, INC.

Architects-Engineers

Water Supply and Purification
Sewage and Industrial Waste Treatment
Municipal Buildings
Airfields, Power Plants
Reports & Investigations

Michigan City — Indiana
Indianapolis — Indiana

FOR RATES FOR THIS SPACE

write

PUBLIC WORKS MAGAZINE

200 So. Broad St., Ridgewood, N. J.

MALCOLM PIRNIE ENGINEERS

Civil & Sanitary Engineers

Malcolm Pirnie — Ernest W. Whitlock
Robert D. Mitchell — Carl A. Arenander
Malcolm Pirnie, Jr.

Investigations, Reports, Plans
Supervision of Construction and Operations
Appraisals and Rates

25 W 43rd St. — New York 18, N. Y.

THE PITOMETER ASSOCIATES, INC.

Engineers

Water Waste Surveys
Trunk Main Surveys
Water Distribution Studies
Water Measurements and Tests
Water Wheels, Pumps, Meters

New York — 50 Church St.

PALMER AND BAKER, INC.

CONSULTING ENGINEERS — ARCHITECTS

Surveys-Reports-Design-Supervision-Consultation
Transportation and Traffic Problems
Tunnels-Bridges-Highways-Airports-Industrial Buildings
Waterfront and Harbor Structures, Graving and Floating Dry Docks
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala. — New Orleans, La. — Harvey, La.

RIPPLE AND HOWE, Inc.
Consulting Engineers
APPRAISALS AND REPORTS
DESIGN AND SUPERVISION
Water Works Systems, Filtration Plants, Irrigation and Drainage Systems, Reservoirs and Dams, Sanitary and Storm Sewer Systems, Sewage Treatment Plants and Refuse Disposal.
O. J. Ripple V. A. Vaseen B. V. Howe
833 23rd St. Denver 5, Colo.

RUSSELL AND AXON
Consulting Engineers
Civil—Sanitary—Structural
Industrial—Electrical
Rate Investigations
408 Olive St., St. Louis 2, Mo.
Municipal Airport, Daytona Beach, Fla.

IRBY SEAY COMPANY
Engineers—Consultants
Water Supply & Treatment Natural Gas Systems
Sewage System & Treatment Electrical
516 Goodwyn Inst. Bldg. Phone JAckson 7-2932
Memphis, Tennessee

SEELYE STEVENSON VALUE & KNECHT
Consulting Engineers
Richard E. Dougherty, Consultant
Civil, Mechanical, Electrical
Airports, Highways, Bridges, Industrial Plants, Dams, Water Supply, Sanitation, Tunnels, Piers, Reinforced Concrete, Steel
101 Park Avenue New York 17, N.Y.

SMITH & GILLESPIE
Municipal and Consulting Engineers
Water Supply, Water Purification
Sewerage, Sewage Disposal, Drainage
Refuse Disposal, Gas Systems, Power Plants
Airports
Jacksonville Florida

FOR RATES FOR THIS SPACE
write
PUBLIC WORKS MAGAZINE
200 So. Broad St., Ridgewood, N. J.

STANLEY ENGINEERING COMPANY
Consulting Engineers
Hershey Building 327 S. LaSalle St.
Muscatine, Ia. Chicago 4, Illinois

ALDEN E. STILSON & ASSOCIATES
Limited
Consulting Engineers
Water Supply, Sewerage, Waste Disposal
Bridges—Highways—Industrial Buildings
Studies—Surveys—Reports
Surveys, Reports, Appraisals
245 No. High St. Columbus, Ohio

UHLMANN ASSOCIATES
H. E. BONHAM
CARL E. KUCK NYE GRANT
Consulting Engineers
Sewage and Industrial Waste Treatment
Water Supply and Purification
4954-4958 N. High St. Columbus 1, O.

FOR RATES FOR THIS SPACE
write
PUBLIC WORKS MAGAZINE
200 So. Broad St., Ridgewood, N. J.

J. STEPHEN WATKINS
J. S. Watkins G. R. Watkins
Consulting Engineers
Municipal and Industrial Engineering, Water Supply and Purification, Sewerage and Sewage Treatment, Highways and Structures, Reports, Investigations and Rate Structures.
251 East High Street Lexington, Kentucky
Branch Office
901 Hoffman Building Louisville, Kentucky

FOR RATES FOR THIS SPACE
write
PUBLIC WORKS MAGAZINE
200 So. Broad St. Ridgewood, N.J.

WHITMAN, REQUARDT and Associates
Engineers — Consultants
Civil—Sanitary—Structural
Mechanical—Electrical
Reports, Plans, Supervision, Appraisals
1304 St. Paul St., Baltimore 2, Md.

CLYDE E. WILLIAMS & ASSOCIATES, INC.
Aerial Mapping
Civil & Sanitary Engineering
312 W. Colfax Ave., South Bend 1, Ind.
720 E. 38th St., Indianapolis 5, Ind.

FOR RATES FOR THIS SPACE
write
PUBLIC WORKS MAGAZINE
200 So. Broad St. Ridgewood, N.J.

HARRY OTIS WRIGHT, JR.
The Wright Engineers
Consulting Municipal Engineers
Box 351
Fairfax Virginia

ROBERT AND COMPANY ASSOCIATES
Municipal Engineering Division
ATLANTA
WATER SUPPLY, SEWAGE DISPOSAL, INCINERATORS, POWER PLANTS

in a very short time. You might need this just once—I assure you that it will be worth it for just that one time.

As a side experience with radio we have learned the value of the alternator type of electric generator. All of our radio-equipped vehicles, all snow plowing trucks, and some special pieces of equipment are equipped with 100-ampere capacity Leece-Neville alternators. These alternators have practically eliminated our battery troubles so it is very seldom that a battery is run down now. In addition to this, we have a transformer on some of the equipment that allows 110-volt AC current to be taken from the alternators. This gives enough current to run a half-inch drill or a couple of small flood lights. This has proved very helpful on many occasions.

Power Failure Insurance

As an insurance against power failure for our base radio station in an emergency, we purchased a Hobart AC-AC welder-generator. This generator has enough capacity to handle our base radio station and a minimum number of lights. We have never needed this yet and the generator has been used only for welding so far.

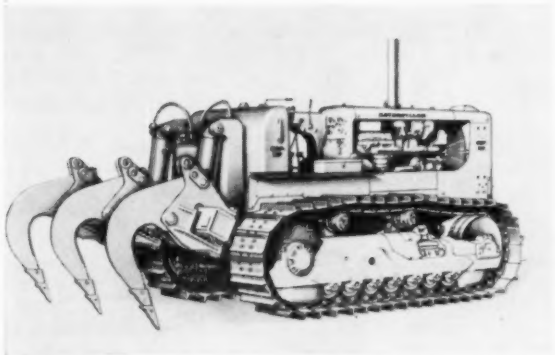
There are so many ways that radio communication will work for you that it is impossible to name them all in this article. It is very probable that every department using radio has different uses for it than even his nearest neighbor. In this day and age you cannot stand still; you either go forward or backward; there is no middle course. With the higher wages paid today and the higher costs of machinery and supplies, you must be as efficient as is possible. This means that you must have good equipment and good administration. One of the best pieces of equipment that you can have is two-way radio. This will give you more service and help than any other piece of equipment that you can get.

I am quite sure that if something would force us to give up our equipment one piece at a time, our radio would be the last thing to be given up. We all like it that much.

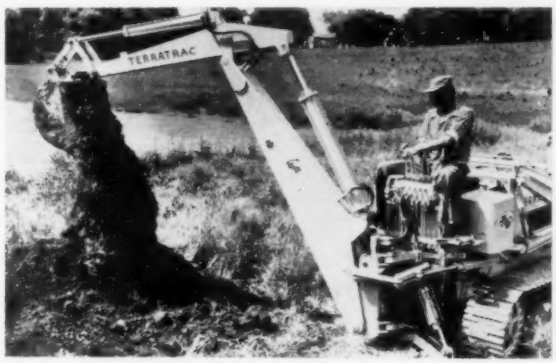
The purchase price of radio is not high. For what it will do it is the cheapest piece of equipment that you will ever buy; it is the best tool that you will ever buy. You will wonder how you got along before you had radio. We often wonder how we got along without radio—you will too.

PUBLIC WORKS
EQUIPMENT NEWS

Published Monthly September, 1956



Cat ripper breaks hard materials for dozing and loading



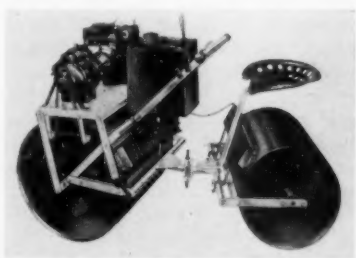
Backhoe has reach of 18-ft., clear dump height of 13-ft.

Tractor Ripper For Cat D9

A new tractor-mounted ripper designed, specifically for use with the Caterpillar D9 Tractor, has been announced by Caterpillar. Increased maneuverability, better control of ripping depth, and extreme utility are the important features of the new ripper. The complete unit consists of two mounting brackets, two hydraulic cylinders, one beam assembly, and three teeth. It weighs 10,830 lbs. and mounts on the bevel gear case through a special drawbar bracket group which replaces the standard drawbar brackets. The ripper is operated hydraulically by two hydraulic cylinders working in conjunction with the hydraulic control. The controls give the operator good control of the ripping depth which can go down to 28 inches. The teeth are swivel mounted; when rocks or other obstructions are encountered, the teeth will swivel up to 10° to minimize side thrusts. It can be used in breaking up old black-top or concrete; for clearing and ripping roots to make dozer work easier; and for breaking frozen ground or stratified shale. For more data write Caterpillar Tractor Co., Peoria, Ill., or circle **No. 9-1** on the reply card.

Moto-Roll ½-ton Roller

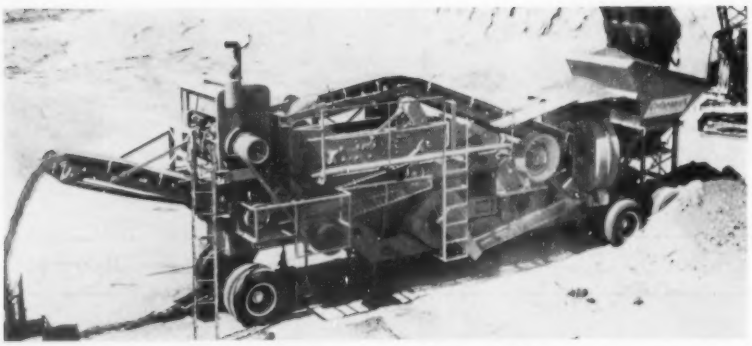
A ½-ton tandem model roller designed to provide economy, speed and efficiency on smaller asphalt paving jobs and all phases of landscape rolling operations has been introduced by Midland Products Co. Because of its size and extreme maneuverability, hand tamping of confined areas is all but eliminated by this machine. This roller can follow right behind the rakers and there is no waiting period required for the asphalt to set. The forward-reverse transmission provides an equal speed ratio in both directions. Coupled dead center of both axles, the guide and compaction roller track one another perfectly, eliminating lap marks. For details write to Midland Products Co., Midland Park, N. J., or circle **No. 9-2** on the reply card.



Roller can be used by city and county maintenance departments for the smaller paving jobs and in landscape rolling

Hydraulic Backhoe For TerraTrac Crawler Tractor

A new TerraTrac backhoe, designed and built exclusively for heavy-duty use on TerraTrac crawler tractors, is announced by American Tractor Corp. The new unit offers many operating and low-maintenance features. It has a lifting capacity of 3000 lbs. for handling pipe. It digs 12½ ft. deep with a reach of 18 ft., and has a clear dumping height of 13 ft. for loading high trucks. A bucket rollback of 90°, controlled by an extra large hydraulic pump, insures heaped loads without spilling. Buckets from 17 to 24 inches wide are available. A full 180° boom-swing with hydraulic foot-pedal control, speeds up cycle-time and greatly simplifies operation. Individually controlled hydraulic outriggers anchor the tractor firmly and prevent it from being "dragged into the hole" during digging operations. The outriggers also have the advantage of being close-coupled to the tractor to permit working within a few inches of buildings, fences, etc. Details from American Tractor Corp., Churubusco (Ft. Wayne), Ind., or circle **No. 9-3** on the reply card.



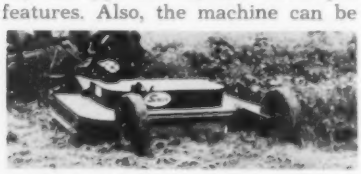
Crusher sizes can be adapted to whatever crushing conditions may be encountered

Crushing and Screening Plant

The "all-new" Cedarapids junior tandem crushing and screening plant has been redesigned to give greater versatility and increased capacity. A larger screening area and a half deck has been added to the horizontal vibrating screen, and the screen width has been increased by 6 ins. The 42-in. x 10-ft., 2½-deck screen increases capacity and adds flexibility for producing from one to three products simultaneously in sizes ranging from 2-in. road ballast down to minus ¼-in. The 10 x 36-in. jaw crusher can be used for the primary capacity necessary to keep the plant operating at peak capacity and handles primary reduction. Secondary crushing is handled by either a 24 x 16-in. or a 30 x 18-in. roll crusher. Crusher sizes can be matched or mixed in any combination to adapt the junior tandem to whatever crushing conditions are encountered. A sand ejector screw for discharging either wet or dry sand onto the sand conveyor, and a spray bar attachment for producing washed aggregates are optional equipment. Further details from Iowa Mfg. Co., Cedar Rapids, Ia., or circle **No. 9-5** on the card.

Servis Model SC-80 Mower

A new Model SC-80 rotary pull-type mower has been developed by the Servis Equipment Co. It is fine for cutting grass, weeds and brush up to one inch in diameter on parkways, expressways and landing fields. It is equipped with a standard Servis gear box and a 3 V-Belt drive assembly. It cuts a full 80-inch wide swath, has two sets of alternate free swinging, or stationary fan type blades, with shear pin features. Also, the machine can be



easily shifted into an offset position, up to 32 inches outside of the tractor right rear wheel, for cutting in close quarters. The wheels are rear mounted and can be supplied with 15-inch or 16-inch drop center rims, or with sectional type puncture proof tires. For further information write Servis Equipment Co., Box 1590, 1000 Singleton Blvd., Dallas, Tex., or circle **No. 9-4** on the reply card.

Pin-Grip Masonry Anchors Speed Fastening Time

For quicker and more convenient fastening, Star Expansion has introduced the Pin-Grip, a one-piece masonry anchor. By merely driving the pin protruding from the head, flush with the head, a permanent, tight fastening job will result. Drill a hole in masonry (concrete, brick, cement block, etc.) with bit or a drill and hammer the diameter of the Pin-Grip. Insert the Pin-Grip through the fixture into the masonry hole and drive the pin flush with the anchor head using an ordinary hammer. The stainless steel pin, nested in the bored aluminum body of the Pin-Grip, forces out four expanding prongs which grip the wall within the masonry hole. It is recommended for securing pipe clamps, electrical features, furring strip, insulation board, wood panels, metal signs, awning frames, etc., to any kind of masonry. A wide range of sizes are available to meet every requirement. For more information write Star Expansion, 142 Liberty Street, New York 6, N. Y., or circle **No. 9-6** on the reply card.

Catch Basin Cleaner For Sewer Maintenance

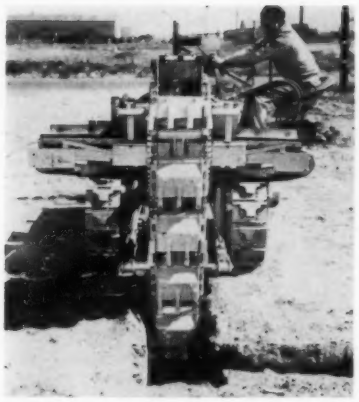
A catch basin cleaner for mounting on any suitable truck, has been announced by the N. P. Nelson Iron Works. The "package" can be completely installed in less than 30 minutes. It provides hydraulic action with a power controlled boom for raising and swinging and all working operations can be performed simultaneously. The entire cleaning, swinging and loading cycle can be completed in less than 30 seconds with all operating controls centralized in the cab. Orange peel buckets in 13½, 15 and 18-in. diameters and a 12 x 17-in. clam shell bucket are available. Hoisting speeds are up to

One man runs this catch basin cleaner

150 ft. per minute with boom swing speeds to 6 complete revolutions per minute. The entire unit can be operated by one man and the bucket can drop 35-ft. below ground with a self-recoiling hydraulic hose reel. Full information from the N. P. Nelson Iron Works, Inc., 850 Bloomfield Ave., Clifton N. J. or circle **No. 9-7** on the reply card.

New Scientific Discovery For Control of Dust

A new product to combat dust, called Golden Bear dust-binder, has been announced by Golden Bear Oil Co. This product is an effective and economical preparation for preventing dust damage. It does not sterilize the soil and is not harmful to newly seeded areas. Dust is a constant source of irritation and annoyance and it reduces the efficiency of workers and may cause illness. A partial list of applications are athletic fields, temporary roads, driveways, parking lots, utility yards and recreational camps. Further information may be obtained from the Chemical Division of Golden Bear Oil Co., P. O. Box 446, Oildale, Calif., or by circling No. **9-8** on the reply card.



Machine can dig a square corner trench

Trencher For Utility Trenching

The Challenge "Universal Trencher" with hydraulic control is designed for utility trenching. It trenches to a 4-ft. depth and 14, 16 and 18-in. widths and has up to 8 digging speeds. The unit digs square corner trenches and cross trenches; and holds line and grade without effort. Fingertip controls switch dirt from side to side without stopping. It trenches easily in a small space and against buildings and makes pipeline stripping safe and easy. Model No. 3A-48 is designed for mounting on the Oliver OC-3 tractor and model No. DA-48 mounts on the 40-C and the 420-C John Deere tractor. Full details from Challenge Mfg. Co., 7400 E. Bandini Blvd., Los Angeles 22, Calif., or circle **No. 9-9** on the reply card.

New Self Propelled Roller Has Versatility

"Poweroll", new ½-ton roller, complete with a 3 hp, 4-cycle air cooled engine, has just been added to the line of products manufactured by Cleveland Formgrader. The new roller is made with a 3/16-in. steel-plate roller drum for general contractor use in compacting roadways and driveways and for lawn maintenance and landscaping. The machine rolls a 35-in. wide path and is equipped with a tractor-type seat for operator comfort. It is easy to transport—only 500 pounds when empty and approximately 1,260 lbs. water filled. It is available with or without a water tank. For details write Cleveland Formgrader Co., Avon, Ohio, or circle **No. 9-10** on the reply card.

Wider, Reinforced Green-Concrete Cutting Blades

The Clipper Mfg. Co. announces two new reinforced break-resistant abrasive green-con blades for sawing "green" concrete. These blades are designed primarily for use in cutting control joints where corrugated cardboard strips are used to control random cracking in highway and airport construction. The C-5419 will produce a saw cut approximately ⅜ inch wide and the C-5424 will make a cut about 7/16 inch wide. For complete information, write the Clipper Mfg. Co., 2800 Warwick, Suite 745, Kansas City, Mo., or circle **No. 9-11** on the reply card.

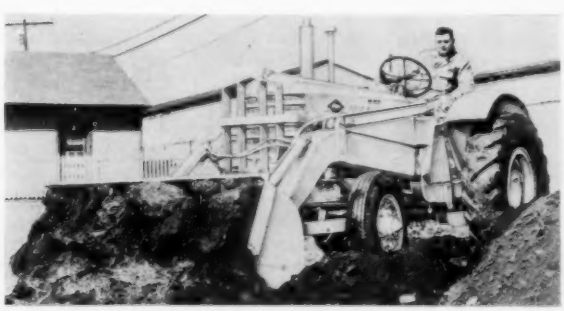
Series F, Kut-Kwick mower is a lighter unit than the one described below

Heavy-Duty Power Unit Performs Multiple Clearing Jobs

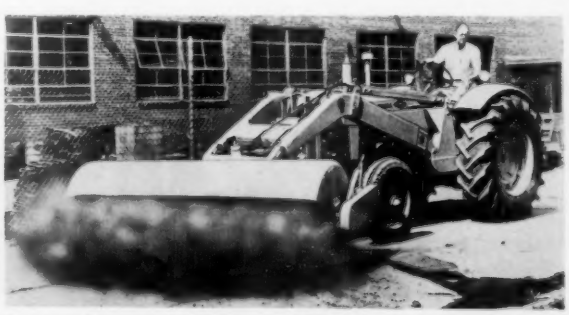
The "Series E" multi-purpose heavy duty power unit announced by the Kut-Kwick Corporation is a unique machine that features a complete series of heavy-duty attachments that enable the machine to mow grass, cut tall weeds and dense underbrush, fell trees, remove stumps, power a snow-dozer blade and plow. Two engine choices are available—either the 6.8 or the 8.25 hp Wisconsin. The unit is self-propelled, and has a reverse drive. It has a full-enclosed, geared transmission which operates entirely independently of the cutter unit. It has free wheeling in neutral, and a differential action axle driving both rear wheels. It is designed for banks up to 60 percent grade, and works very well on rough, rocky terrain. The large rear wheels and the balanced weight distribution allow the operator to lift the cutter over rocks, stumps, etc., with light finger pressure. The large wheels also give a 9-inch clearance and the cutter assembly (only one of the many attachments used), cuts a swath a full 36-inches wide. For additional details write to Kut-Kwick Corp., Department P-41, Brunswick, Georgia, or circle **No. 9-13** on the reply card.

Broom and Front End Loader For M-H-F Tractor

The new Massey-Harris-Ferguson Work Bull model 404 tractor can be used with a sweeper-broom and frontend loader attachment for county, municipality and general industrial work. With a 5-ft., 30-inch diameter brush, this sweeper-broom can be swung to 30 degrees right or left. This tractor and attachment "package" can keep access roads and thoroughfares free of dust and debris. Also available for the tractor is a ⅝-yd. frontend loader with a lifting height of 10 ft. 6 in., and a dumping height of 8 ft. 6 in. For full details write Massey-Harris-Ferguson Inc., Quality Ave., Racine, Wis., or circle **No. 9-12** on the card.



Loader and tractor make a good unit for construction work



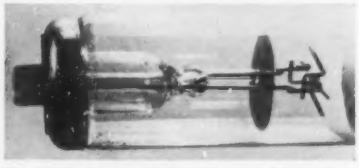
Sweeper-broom attachment for M-H-F Work Bull 404 tractor

Trencher For Massey-Harris Tractors

The Everett trencher is now available to owners of Massey-Harris tractors. The trenchers in all models are fast digging in any type of soil and are maneuverable and rugged and have hydraulically controlled conveyors. The model 60 digs trenches to 5 feet deep and up to 300 lineal feet an hour. These trenchers are excellent for municipalities, contractors, utility companies and road builders. Full specifications from the Earth Equipment Corp., 2036 Sacramento Street, Los Angeles 21, Calif., or circle **No. 9-14** on the reply card.

Fluorescent Lamp Introduced by Sylvania

A fluorescent lamp, which provides two and one-half times as much light as conventional models and which is universal in application, is introduced by Sylvania Electric Products. The new standard-shaped lamp, termed the VHO (very high output) comes in two models—a 100-watt four-foot model rated at 6,200 lumens, and a 200-watt eight-foot model of 13,250 lumens. Outstanding features include—more efficient lamp diameter, rapid start continuous filament



Very high output fluorescent lamp provides two and half times as much light

heating, "pressure control" center and the use of neon gas. The new lamps, which will initially be available only in the Cool White color, are applicable to both indoor and outdoor service. Street lighting, parking lots, outdoor storage areas and floodlighting are outdoor applications. Indoor utilizations are high bay industrial lighting and commercial lighting. For complete information write Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y., or circle **No. 9-15** on the reply card.

Plastic Expansion-Joint Waterstop

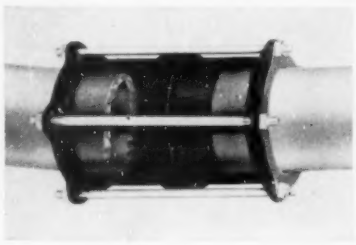
Progress Unlimited Inc. has just introduced a 3-in-1 joint, made of extruded plastic (poly-vinyl-chloride) that can be used as an expansion joint, as a construction joint or as a waterstop. It comes in continuous strips 100 feet long and 5 or 6

Extruded plastic for expansion joints

inches wide. It can be cut with a knife and spliced on the job with a hot iron in minutes. Its deep grooves grip far better into the concrete than flat or dumbbell type joints and its reinforced "U" shaped center pleat expands and contracts with the joint. It is designed to give the most effective joint between two pours of concrete. It will resist water pressures up to 125-ft. head and stays flexible even in extreme low temperatures. For more information write to Progress Unlimited Inc., 15 West 44th St., New York 36, N. Y., or circle **No. 9-16** on the reply card.

Break Repairs Made Easy

Smith-Blair has announced an improved coupling for repairing misalignment breaks in water, gas or oil pipelines. It is called the Series 4K Flexible cut-in-coupling and is applicable to cast iron, asbestos-cement or steel pipe and is installed with the pipe in place. A unique feature of this design is a dual sleeve plus a centering ring. When the break in the pipe is cut out sufficiently for one sleeve to be placed, all the parts of the cut-in coupling are then assembled to repair-connect the pipe while in place. The cut-in coupling consists of two sleeves, two gaskets, two flanges and a centering ring complete with gaskets which are tightened, as an assembly, on the pipe with through bolts. Sizes from 2 through 12-inches are now in production. Larger sizes, in steel, are also available. More information from Smith-Blair, 535 Railroad Ave., South San Francisco, Calif., or circle **No. 9-17** on the reply card.



Hensley Ripper Aids Bucket Loader Operations

A new type ripper, designed especially for speeding up bucket loader operations, has been developed by Hensley. Cast of special alloy moly-manganese steel, the ripper clamps directly to the lower lip of any standard bucket loader, enabling the operator to rip and loosen dirt for easier, faster loading. Each unit consists of two ripper teeth rigidly mounted 12 inches apart by three heat treated steel spacer self-sharpening wearpoints, angled downward to provide an 8-inch penetration when the bottom of the bucket is parallel to the ground. They are completely installed or removed within 60 seconds by one man. More details from Hensley Equipment Co., Inc., 800 Peralta Ave., San Leandro, Calif., or circle **No. 9-18** on the reply card.

Tamper being used on construction job compacting a trench along a highway

Highway Maintenance Tool

A new blade accessory that makes it possible to use the Jay Tamper as an asphalt cutting tool has just been announced by The Jay Co. Available in different depth size cutting blades, the new unit can be used in place of heavier equipment. It cuts handily at a rate of from 5 to 9 feet per minute, depending on thickness and aggregate. In addition, a new asphalt tamping blade, called the Smooth-edge blade, enables an operator to tamp to greater and more uniform compactness. For more information write The Jay Co., 168 Hosack St., Columbus, Ohio, or circle **No. 9-19** on the reply card.

Stump cutter available in two models

Remove Troublesome Tree Stumps

A stump cutter that will cut out any size stump below the level of the sidewalk or lawn area has been introduced by Asplundh Chipper. Made in two models—8½ and 15-in. cutter—the units can be mounted on almost any tractor and require only a one-man operation. Model 85H cuts 16-inches below grade and Model 150H cuts 21 inches below grade. For full information write Asplunduh Chipper Co., 505 York Rd., Jenkintown, Pa., or circle **No. 9-20** on the reply card.

Elevating Tail Gate For Pick-Up Trucks

A new elevating tail gate for pick-up trucks, the "Watson Weightlifter", has been introduced by H. S. Watson. It is easily loaded from either side (as well as back) for parallel curb parking and has a lifting capacity of 650 lbs., is hand winch-operated, with a completely automatic load brake in operation at all times. Installation takes only 3 to 4 hours and it can be reinstalled quickly on another truck. For further information write to H. S. Watson Company, Emeryville 8, Calif., or circle **No. 9-21** on the reply card.

Small Hydraulic Trencher

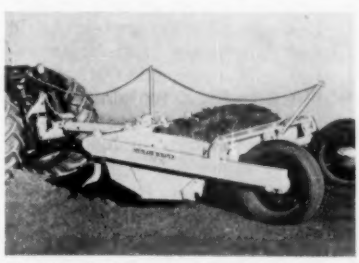
A new "Ditch-A-Line" hydraulic trencher which digs a 2-in. by 20-in. deep trench up to 400 ft. per hour, dependent upon soil type, is announced by M & W Iron Works. The entire mechanism is mounted on crawler tracks driven hydraulically and the self-tightening digging chain is also hydraulically driven and is designed to discharge debris without chain breaking. The unit is driven by a 6 hp. gasoline engine with a reduction gear and hydraulic drive. Its length is 83 in., the height is 42 in. and the width is 27 in.; its shipping weight is 425 pounds. It is used for the installation of sprinkler systems, gas and water lines. Additional information from M & W Iron Works Co., 1928 N. Topeka, Topeka, Kans., or circle **No. 9-22** on the reply card.

New Color Coatings Brighten Up Plant Appearance

It is possible to "brighten" Public Works Utility installations currently protected by asphalt coatings by a new coating system consisting of "Lankote asphalt sealer". This is colorful and has excellent adhesion to old or new asphalt, prevents bleeding completely, and is easy to apply. It can be obtained in any color with the exception of pure white. Asphalt-base coatings, because of their excellent characteristics and economy, can still be used for protection, and one coat of the sealer, in any color desired, can be used to improve plant appearance. Further information from the J. Landau Co., Carlstadt, N.J., or circle **No. 9-23** on the reply card.

Scraper For IHC 300 Tractor

The Overland scraper, made by Western Equipment has been approved for use with the IHC 300 utility tractor. Because of its unique construction the scraper does a fine job of grading and levelling, as well as making excavating easier and carrying loads over ditches, curbs and other obstructions. It attaches to the quick hitch of the IHC 300 and is controlled by the hydraulic system of the tractor. In addition it has four ripper teeth located in front of the scraper blade to break hard, dry soils and make loading easier. Rear wheels are set inside the scraper frame to cut close to banks and allow continuous cuts for excavating. Further information from Western Equipment Mfg. Co., 105 S. Kenwood St., Glendale, Calif., or by circling **No. 9-24** on the reply card.



High bowl clearance will permit moving over curbs and other obstructions

ACCURATE
pH, CHLORINE, FLUORIDE CONTROL
with TAYLOR COMPARATORS

REDUCES CHEMICAL WASTE

With Taylor Comparators, you can make fast, accurate analyses of pH and chlorine that enable you to determine the *exact* amounts of chemicals needed to control coagulation, chlorination, fluoridation and corrosion. Easy, on-the-spot colorimetric tests are made in minutes . . . just take sample, add reagent and move color standard slide across until colors match. Complete water analysis only a little more detailed with the Taylor Water Analyzer.

COLOR STANDARDS GUARANTEED

Taylor liquid color standards carry an unlimited guarantee against fading . . . no danger of mechanical inaccuracy.

SEE YOUR DEALER, or write direct for FREE HANDBOOK, "Modern pH and Chlorine Control". Gives theory and application of pH control. Illustrates and describes all Taylor sets.

W. A. TAYLOR AND CO.
7304 YORK RD. • BALTIMORE-4, MD.

SODIUM SILICOFLUORIDE
(Fluosilicate)

Inquiries Invited!

TENNESSEE TC CORPORATION
1028 Connecticut Ave., N. W.
WASHINGTON 6, D. C.

CLASSIFIED ADVERTISING AND JOB OPPORTUNITIES

UTILITIES ENGINEER WANTED

The position assists the Superintendent of Water and Sewers in the administration of the water and sewage systems.

Considerable experience in a progressively responsible technical and administrative capacity including engineering and operations experience in a water utility or sewage system. Graduation from a four year college or university with specialization in Civil, Mechanical or Sanitary Engineering. Eligible to be registered in the State of Arizona. An applicant for Arizona registration shall be age 25 or over and have 8 years engineering experience, for which up to 5 years of training or teaching in engineering may be equated.

Salary Range — $575 — $700 per month depending on qualifications. Starting rate may be $600 or $625.

Age Limit — Applicants 25 to 55 years of age.

Apply to:

Leroy J. Brenneman
Personnel Director
City Hall
Phoenix, Arizona

AIRPORT ENGINEER WANTED

Philadelphia's busy expanding International Airport has a vacancy for a Chief Engineer. Excellent Opportunity for the right man. Requires degree in C.E. and 7 years engineering experience including 4 years in aviation or airport engineering and 2 years in a technical administrative capacity. Starting salary $9333 per year or higher. For further information apply before September 10, 1956 to:

Personnel Dept.
Room 975-C
City Hall
Philadelphia 7, Pa.

OFFICE ENGINEERS WANTED

Office Engineers are wanted to design municipal street paving and sewer projects. Live in heart of beautiful Ozarks, land of hunting, fishing, and many sports activities, excellent school system—grade, high school, and college, reasonable living costs. Salary commensurate with training and experience, plus paid vacation and sick leave.

Contact:

Personnel Department
City Hall
Springfield, Missouri

SEWAGE PLANT OPERATOR

Capable of operating and maintaining modern 1.5 MGD complete treatment plant, making chemical analyses and preparing reports. Pleasant Western Pennsylvania community, population 8,000. Salary $3800-$4500 to start.

Write to:

Borough Manager
Grove City, Pennsylvania

CHIEF ENGINEER WANTED

A Midwest City is desirous of employing a Chief Engineer of the Utilities and City Engineer. Must be registered. The position requires supervision over all engineering, Electric, Sewer, Water and Civil. Salary open.

Write to:

Box 9-1
Care of this Magazine

HIGHWAY OFFICIALS & ENGINEERS

Talbot's Railway Transition Spiral
Revised and Enlarged By
E. H. Roth, Asst. Engr., N&W Ry. Co.
79 Pages Text, 83 Pages Tables
For use in highway layouts & construction
Pocket size—Leatherette cover
Price $5.00, postpaid.

Order your copy of this valuable book today.

E. H. ROTH
2114 Memorial Ave., S.W.
Roanoke, Virginia

LEGAL NOTICE
CITY OF HAZEL PARK

Applications are being accepted for the position of City Engineer for the City of Hazel Park, Michigan, at a tentative salary of $8,000 per year.

Write to:

Mrs. Lenore Armour, City Clerk
22422 Stephenson Highway
Hazel Park, Michigan

Twin City Pigeon Eliminating Co.

Professional Bird Pest Control Engineers

LOUIS J. NEID
"The Original Pigeon Piper"
ONLY APPROVED HUMANE METHODS EMPLOYED
2083 N. LEXINGTON AVE., ST. PAUL, MINN.

What you should know about

SOIL ENGINEERING

by LEO J. RITTER, JR.

SOIL engineering is the practical application of engineering principles to problems involving the use of soil, either in its natural condition or as a construction material. In this authoritative booklet all phases of soil engineering are treated in simple, easily understandable language. Full information is provided on basic soil properties, classification systems, field and laboratory tests, frost action and compaction. Liberally illustrated and containing many special charts and graphs to assist the engineer in his work.

ORDER from Book Department, PUBLIC WORKS, 200 So. Broad St., Ridgewood, N. J. Only $1.00 per copy.

High Production In-Place Rock Breaker

A new in-place materials reducer which crushes all types of native rock to 2-inch size aggregates right on the roadbed is announced by Bros. Twenty-two free-swinging impact hammers break materials at unusually high production rates. The unit also can be used to pulverize old blacktop paving for re-use

Rock breaker crushes all types of native rock and can be drawn by any make tractor with thirty or more hp.

and for breaking pit-run gravel. It can be drawn by any tractor with 30 or more hp. and is available with either gas or diesel engine. For full information write Road Machinery Division, Wm. Bros Boiler & Mfg. Co., Minneapolis 14, Minn., or circle **No. 9-25** on the reply card.

Marion Announces 3/4 Yard Shovel, 18 Ton Crane

A ¾-yard shovel and 18-ton crawler crane has been announced by Marion Power Shovel. It will be known as the 35-M and will be offered both with crawler and truck mountings. The truck crane will be known as the 35-MR and is rated at 25 tons. Principal design and construction features include: Fast, easy convertibility of front-end equipment (shovel, dragline, clamshell, crane, hoe) without any machinery changes; air controls for ease of operation; self-cleaning, non-clogging crawlers; and independent boomhoist for power up, power down control of the boom as standard equipment. Cab interiors and operating machinery are finished in metallic gray, selected for its ability to reflect light and resist soiling. Details from Marion Power Shovel Co., Marion, Ohio, or circle **No. 9-26** on the reply card.

Kansas City ASCE Conference on Sanitary Engineering

The Kansas City section of the American Society of Civil Engineers is sponsoring a Sanitary Engineering Conference which will be held at the Continental Hotel, Kansas City, Missouri, November 19 and 20, 1956.

• • •

Utility Engineer Needed for Water and Sewage

Phoenix, Arizona, is seeking a Utilities Engineer to assist the Superintendent of Water and Sewers. Experience is necessary, and the applicant must be a graduate in civil, sanitary or mechanical engineering. Age limits are 25 to 55; salary is from $575 to $700 per month. Write L. J. Brennan, Personnel Director, City Hall, Phoenix, Ariz., for further information.

• • •

Graduate Training in Public Health

The Health Amendments Act of 1956, which was passed by the Senate on June 11 and by the House of Representatives on July 23, authorizes the Public Health Service to establish a program of traineeships for graduate public health training of Professional public health personnel. The Surgeon General has requested that a preliminary announcement be made of the establishment of this new traineeship program, contingent upon appropriation of funds by the Congress for the present fiscal year.

The public health traineeship provisions of the Act are designed to supplement—not replace—the training activities currently being supported by State and local health agencies. With respect to training for engineers under this program, only graduate or specialized public health training will be provided—not basic professional preparation.

A committee is being appointed to advise on administration of the traineeship program, including the development of program standards and policies. Policy and procedural materials will be distributed as soon as they are completed. Information regarding availability of traineeships for engineers, and regarding stipends, allowances, submission of applications, etc., will be available from the Chief, Division of General Health Services, Public Health Service.

NEWS OF ENGINEERS

E. RALPH SIMS has joined Alden E. Stilson & Associates, Consulting Engineers, Columbus, O., as director of the recently formed service to management in the field of Industrial Engineering. Mr. Sims has had a great deal of experience and is a registered industrial engineer in New York, Ohio and Pennsylvania.

R. H. BALDOCK, former State Highway Engineer of Oregon, is now stationed in Baghdad as Chief Engineer of the Edwards, Kelcy & Beck Highway Mission in Iraq. He replaces E. L. WORTHINGTON who has returned to this country and is in charge of the EK&B portion of the Connecticut Turnpike. The work in Iraq is approaching completion of the initial $78 million program; an additional $180 million is being allocated for work over the next six years.

JOHN R. SNELL and W. I. KENERSON have announced the formation of a new consulting engineering firm, Michigan Associates, which will have offices in Lansing, Mich. The new firm, successor to John R. Snell & Associates, will specialize in water, sewerage, industrial wastes, refuse, highways, airports and similar work.

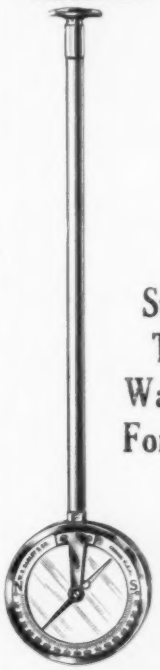
L. STERLING HEDGEPETH, formerly chief of the Specifications and Materials Section, Construction Branch, Bureau of Public Roads, in Washington, has been appointed District Engineer for the Bureau in Liberia. He will develop and direct the highway project of the ICA in that country. He is also consulting engineer for the Government of Liberia.

KENNETH E. SHULL has been appointed Director of Public Relations for the Philadelphia Suburban Water Co., Bryn Mawr, Pa. A chemist and bacteriologist, Mr. Shull is a member of many technical societies.

COL. JACK J. HINMAN, JR., well known to all sanitary engineers, died in Orleans, France, in July. Col. Hinman was visiting his daughter after a tour of overseas sanitary engineering work.

LANGDON PEARSE, long time outstanding sanitary engineer in the Chicago Sanitary District (since 1909), died July 20. He was 79 years of age.

DARLEY MAGNETIC DIPPING NEEDLES



$17.50

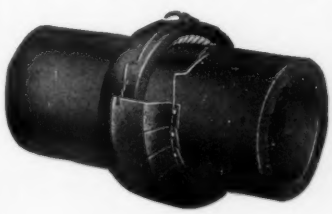
Standard With Thousands of Water Works Men For Over 48 Years

with 3 section telescoping handle ←$22.25

Write today for 100 Page Catalog

W. S. Darley & Co.
Chicago 12

BUILD BETTER SEWER LINES



with
WESTON
GASKETS and FORMS
for
SEWER PIPE JOINTS
(a cement joint)

• No jute used—gasket centers spigot. • Definite space in each joint for cement. • Form confines cement-grout to lower portion of joint • Particularly advantageous in water bearing trenches. • Infiltration minimized.

L. A. WESTON CO.
Adams Ma

INDEX OF ADVERTISEMENTS

Abrams Aerial Survey Corp. 215
Acker Drill Co., Inc. 186
Adams Co., Inc., R. P. 155
Adelphia Hotel 210
Aero Service Corp. 215
Air Survey Corp. 215
Alabama Pipe Co. 58
Albright & Friel, Inc. 215
Allied Chemical & Dye Corp. 85
Allis-Chalmers Co. ..... 145, 191 & 209
Alster & Associates, Inc. ..... 56 & 215
Alvord, Burdick & Howson 215
American Cast Iron Pipe Co. 28
American Concrete Corp. 91
American-Marietta Co. 55
American Photocopy Equipment Co. ..... 35 & 36
American Playground Device Co. 148
American Road Builders' Assoc. 34
American Tractor Corp. 73
Asphalt Institute ..... 10 & 11
Asplundh Chipper Co. 72
Atlas Industries, Inc. 142
Atlas Mineral Products Co. 194
Austin-Western Works
Baldwin-Lima-Hamilton Corp. ..... 16 & 17
Ayer-McCarel Clay Co., Inc. ..... 24 & 25

Badger Machine Co. 228
Baker, Jr., Michael Inc. 215
Bannister Engineering Co. 215
Barber-Greene Co. 37
Barker & Wheeler 215
Barstow & Associates, E. D. 215
Baughman Mfg. Co. 211
Bell, Howard K. 215
B-I-F Industries 84
Black & Veatch 215
Bogert and Childs 215
Bowe, Albertson Assoc. 215
Bowerston Shale Co. ..... 24 & 25
Bros Boiler & Mfg. Co., Wm. 167
Brown & Blauvelt 215
Brown Engineering Co. 215
Browne & Associate, Floyd G. 215
Buchart Engineering Corp. 215
Buck, Sifert & Jost 215
Buffalo Meter Co. 177
Builders Providence 84
Burgess & Niple 215
Burke, Inc., R. H. 215
Burns & McDonnell Engr. Co. 215
Butler Mfg. Company 220
Byron Jackson Pumps, Inc. 173

Caird, James M. 215
Calgon, Inc. 86
Camp, Dresser & McKee 215
Cannelton Sewer Pipe Co. ..... 24 & 25
Capitol Engineering Corp. 216
Cast Iron Pipe Research Assoc. ..... 8 & 9
Caterpillar Tractor Co. 4, 96, 181
Chain Belt Company 199
Chester Engineers 216
Chicago Pump Co. 3
City Tank Corp. 71
Classified Ads 224
Cleveland Trencher Co. 151
Clow & Sons, James B. 51
Cole & Son, Chas. W. 216
Columbia-Geneva Steel Div. ..... 14 & 15
Computer-Measurements Corp. 48
Consoer, Townsend & Assoc. 216
Conveyor Company 93
Cotton, Pierce, Streander, Inc. 216

Danuser Machine Co. 200
Darley & Co., W. S. 225
Deere, John 43
Industrial Division
DeLeuw, Cather & Co. 216
Dempster Brothers, Inc. ..... 18 & 19
Diamond Alkali Company 54
Dickey Clay Mfg. Co., W. S. ..... 24 & 25
Dotmar Industries Inc. 202
Dresser Industries, Inc.
(See Dresser Mfg. Div.)
Dresser Mfg. Div. 63

Enterprise Engine & Machinery Co. 175

Fairbanks-Morse & Co. 153
Fay, Spofford & Thorndike, Inc. 216
Finkbeiner, Pettis & Strout 216
Fischer & Porter Company 62
Fisher Research Lab., Inc. 158
Fitchburg Engineering Corp. 82
Flexible Inc. 211
Flynn & Emrich Co. 42
Ford Meter Box Co. 172
Ford Motor Company 81
Tractor & Implement Div.
Fridy, Gauker, Truscott & Fridy, Inc. 216
Frink Sno-Plows 183

Galion Iron Works & Mfg. Co. 2
Gannett, Fleming, Cordrey & Carpenter, Inc. 217
Gar Wood Industries, Inc ..... 22 & 23
General Electric Company 75
Outdoor Lighting Dept.
Gilbert Associates Inc. 217
Golden Anderson Valve Specialty Co. 200
Gorman-Rupp Company 206
Graham Parking Engineers 216
Graver Water Conditioning Co. ..... 66 & 67
Gray & Osborn 217
Greeley & Hanson 217
Green Co., Howard R. 217
Greenlee Tool Co. 78
Greer Engineering Associates 217

Hagan Corp. 86
Hamilton Kent Mfg. Co. 41
Harley & Assoc., Frank E. 217
Havens & Emerson 217
Hays Process Company 203
Hazen & Sawyer 217
Heil Co., The 157
Heltzel Steel Form & Iron Co. 147
Henningson, Durham & Richardson, Inc 217
Hercules Powder Co. 69
Hill & Hill 217
Homestead Valve Mfg. Co. 171
Hotel Jefferson 164
Hough Co., Frank G. 149
Hurd Aerial Surveys, Inc., Mark 217
Hydrauger Corp., Ltd. 158

International Harvester Co. ..... 12, 13, 29 & 187
International Salt Company 159

Jackson Vibrators, Inc. 80
Jaeger Machine Co. 47
Jay Corporation 163
Johns-Manville 74
Jones Co., John Wiley 68
Jones, Henry & Williams 217

Kaiser Aluminum & Chemical Sales, Inc. 213
Katolight Corporation 58
Keasbey & Mattison Company 94
Kennedy, Clyde C. 217
Kerrigan Iron Works, Inc. 95
Kohler Company 198
Knowles, Inc., Morris 217
Kwik-Mix Co. 52

Leopold, F. B. 202
Le Roi 79
Div. of Westinghouse Air Brake Co.
Le Tourneau-Westinghouse Co. ..... 184 & 185
Lewis, Harold M. 217
Link-Belt Co. 6
Littleford Bros. Inc. 140
Little Giant Crane & Shovel, Inc. 166
Lock-Joint Pipe Co. 61
Lozier & Co., Wm. S. 217

Mall Tool Company 88
M & H Valve & Fittings Co. 196
Massey-Harris-Ferguson, Inc. ..... 32 & 33
M-B Corporation 197
M-C-G Company 56
McWane Cast Iron Pipe Co. 162
Mebus, Inc., George B. 217
Merritt & Welker 217
Metcalf & Eddy 217
Mid West Body & Mfg. Co. 48
Mid-Western Industries, Inc. 92
Modern Swimming Pool Co., Inc. 214
Morse Boulger Destructor Co. 160
Mueller Co. 49

Natco Corp ..... 24 & 25
National Clay Pipe Mfrs., Inc. 143
Neenah Foundry Company 90
Neptune Meter Company 53
Nichols Engineering & Research Corp. 21
Northern Gravel Co. 156

Onan & Sons, Inc., D. W. 170
Orangeburg Mfg. Co., Inc., ... 83

Pacific Flush Tank Co. 205
Pak-Mor Mfg. Co. 201
Palmer and Baker, Inc. 217
Palmer Filter Equipment Co. 50
Phelps Dodge Refining Corp. 146
Phelps, Inc., Boyd E. 217
Pirnie Engineers, Malcolm 217
Pitometer Company 217
Pittsburgh-Des Moines Steel Co. 195
Pollard Co., Inc., Joseph G. 87
Pomona Terra-Cotta Co. ..... 24 & 25
Portland Cement Assn. 165
Preload Company, Inc. 44
Public Words 188

Ranney Method Water Supplies Inc. 89
Reed Mfg Co. 214
Reliance Chemicals Corp. 70
Ridge Tool Company 57
Ripple & Howie, Inc. 218
Roberts & Co., Assoc. 218
Roberts Filter Mfg. Co. 64
Rockwell Manufacturing Co. 169
Rothlan Corp. 166
Russell & Axon 218

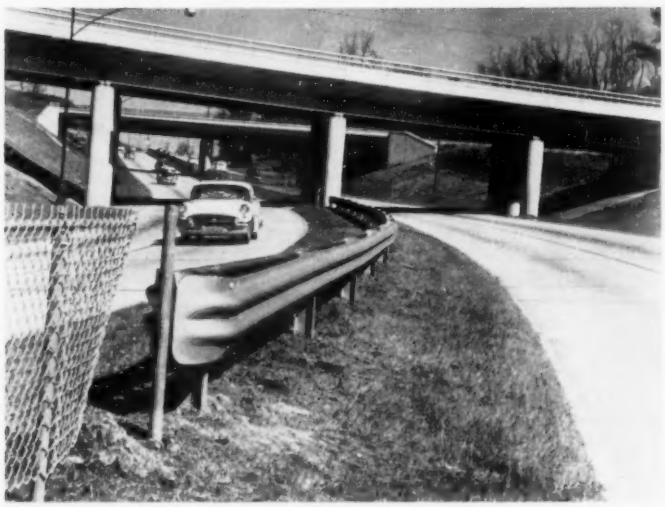
Schmieg Industries, Inc. 77
Seaman-Gunnison Corp. 20
Seay Co., Irby 218
Seelye Stevenson Value & Knecht 218
Servicised Products Corp. 182
Servis Equipment Co. 59
Sherman Products, Inc. 189
Simplex Valve & Meter Company 207
Skinner Co., M. B. 65
Smith & Gillespie 218
Soil Mover Company 210
Solvay Process Div. 85
Sparkler Mfg. Co. 46
Sparling Meter Company 198
Stahl Metal Products, Inc. 188
Standard Dry Wall Products Inc. 174
Stanley Engineering Co. 218
Stilson Assoc., Alden E. 218

Taylor & Co., W. A. 223
Tennant Company, G. H. 144
Tennessee Coal & Iron Div. ..... 14 & 15
Tennessee Corp. 223
TerraTrac 73
Texas Vitrified Pipe Co. ..... 24 & 25
Traffic & Street Sign Co. 152
Trickling Filter Floor Institute ..... 24 & 25
Troian Mfg. Co. 52
Tropical Paint Co. 60
Turbine Sewer Machine Co. 186
Twin City Pigeon Eliminating Co. 224

Uhlmann & Associates 218
Union Metal Mfg. Co. 27
United Steel Fabricators, Inc. 26
Universal Motor Company 50
U. S. Pipe & Foundry Co 193
U. S. Steel Corporation ..... 14 & 15
U. S. Steel Export Co. ..... 14 & 15
U. S. Steel Supply Div. ..... 14 & 15

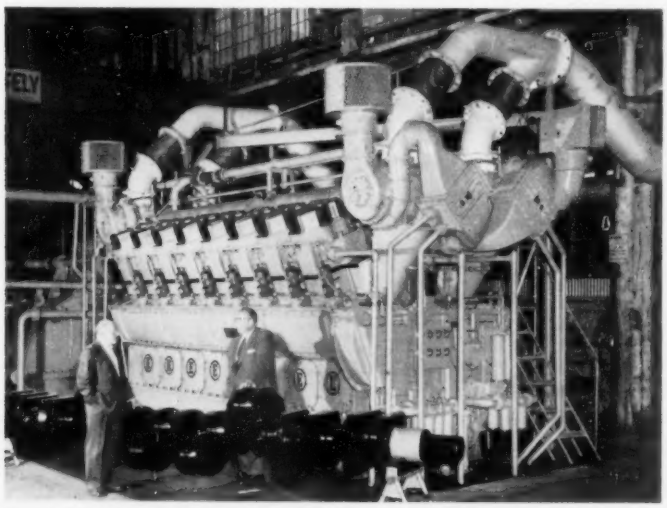
Wain-Roy Corp. 89
Wagner Iron Works 45
Wallace & Tiernan Co., Inc. ..... Back Cover
Watkins, J. Stephen 218
Western Machinery Co. 161
Westinghouse Electric Corp. ..... 38 & 39
Lighting Division
Weston Co., L. A. 225
White Motor Company ..... 30 & 31
Whitman, Requardt & Assoc. 218
Williams & Assoc., Inc., Clyde E. 218
Wood Co., R. D. ..... 178 & 179
Woodward Iron Company 208
Worthington Corp. 76
Wright, Harry Otis, Jr. 218

—Worth Seeing



Expressway dividers of Flex-Beam guardrail are solving a problem for the city of Atlanta, Georgia, on dangerous curves. The double-lined guardrail prevents drivers from cutting across divider strips, helps regain control if car leaves the road and protects approaching drivers and the bridge. Photo courtesy Armco Drainage and Metal Products, Inc.

To avoid down-time while waiting for heavy tractor equipment to be trucked from another job, the operator of this Model MH 4-wheel drive Hough "Payloader" decided to try to pull the heavy 27-ft. tailing blade with his tractor-shovel. It worked so well that the contractor is now using this method on all similar jobs.



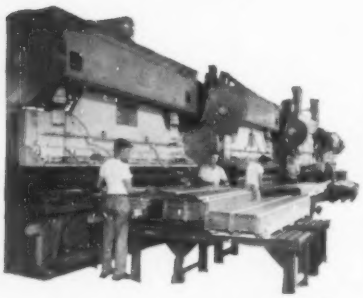
Here's the largest diesel engine ever built on the Pacific Coast, a V-type 16-cylinder Enterprise rated at 7700 hp at 400 rpm. It's the prototype of a new line of industrial diesels to be built in 12- and 16-cylinder models.

The beauty in the center is a new forged disc aluminum wheel for tubeless truck tires that was recently announced by Aluminum Company of America. The wheel's high thermal conductivity and light weight give assurance of cooler running and longer lasting tires and bigger payloads.

"Here come the elephants!" It's a far cry from that old day since the last great circus went off the road forever. But these International Harvester monsters are pulling 17-yard scrapers on a 63-acre location, shifting wet clay with a speed and power that no ponderous pachyderm could match.

Don't build an eye-sore

for beauty



—at low cost—

buy BUTLER

Striking appearance is not incompatible with low building costs. Your Butler Builder and the Butler Building System can give you distinctive, modern buildings at mass production prices. The key: a combination of exterior materials of your choice and design with pre-engineered, mass-produced Butler structurals and a die-formed Butler metal roof. The result: good looks at low cost, plus other advantages like fast erection, use of inexpensive non-load-bearing curtain walls, the exceptional stability of steel structurals. For the full story on Butler buildings, write on your company letterhead for informative brochure, or call your Butler Builder.

See "Buildings" in the yellow pages of your phone book for name of your Butler Builder.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7321 East 13th Street, Kansas City 26, Missouri

Manufacturers of Steel Buildings • Oil Equipment
Farm Equipment • Dry Cleaners Equipment
Outdoor Advertising Equipment • Special Products

Sales Offices in Los Angeles, Richmond, Calif. Houston, Tex. • Birmingham, Ala. • Minneapolis, Minn. Chicago, Ill. • Detroit, Mich. • New York, N. Y. Burlington, Ont., Can.

WORTH TELLING

by Authur K. Akers

Mr. Buehler

★ This month's addition to PUBLIC WORKS' advertising sales force is Robert F. Buehler who will assist Eastern Sales Manager Bill Morris from New York south to Washington. Bob is a young man with a lot of advertising experience and ability whom you will find helpful in your contacts with him.

★ A. M. BYERS CO., Pittsburgh, promotes Frank Farnan to assistant to Vice President B. M. Byers.

★ R. N. RICK is the new advertising and sales promotion manager, Perfection Steel Body Co., Galion, Ohio.

★ W. E. (Bill) THOMAS becomes regional manager in Decatur, Ga., for Homestead Valve Mfg. Co., Coraopolis, Pa.

★ AUSTIN-WESTERN WORKS, Construction Equipment Division, Aurora, Ill., appointments include J. Arthur Fitzenz, manager domestic sales; A. Merrill Smith, assistant manager.

★ J. R. THOMAS is new advertising manager of Layne & Bowler Inc., Memphis, the big deep well and pump people.

★ LeTOURNEAU - WESTINGHOUSE CO. starts a $9,000,000 building expansion program at Peoria that will increase productive capacity more than 150% over 1953.

★ NEPTUNE METERS will be represented in the Carolinas now by John Paul McCullough; in Pennsylvania by Hood van den Arend, Jr., and Joseph R. Vetromile.

★ CAST IRON PIPE RESEARCH ASSOCIATION is "doing something" about the water scarcity problem. Two helpful films they offer are available. Address them Peoples Gas Building, Chicago 3, for loans of these.

★ DORR-OLIVER Inc., announces a $900,000 manufacturing expansion program to include two new buildings at Hazleton, Pa.

★ SHUNK MFG. CO., Bucyrus, Ohio, acquires an eastern plant, at Tuckahoe, N. Y. to make more scraper and grader blades, and to ship them quicker.

★ FISCHER & PORTER Co., Hatboro, Pa., changes the name of its Chlorination Division to Water and Waste Division.

★ A NEW DIVISION is formed by S. Morgan Smith Co., York, Pa., to handle all its valve manufacturing and sales operations, headed by Carl J. Wilcox, formerly manager of valve sales.

Mr. Wilcox

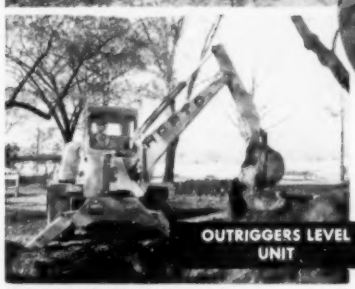
Mr. Harris

★ EARL F. HARRIS is elected president of the Rodney Hunt Machine Co., Orange, Mass. He has been executive vice president since 1952.

★ HENRY M. MAUTNER is the new New York district sales manager, B-I-F Industries, Inc., Providence. He formerly managed the New England sales office.

★ SMITH-BLAIR Inc., South San Francisco, Cal., names Richard A. Ball sales engineer.

★ "LOOKS LIKE RAIN," remarked the tourist to the old-timer in the arid west. "I sure hope so," sighed the old man. "Not for me but for my grandson here. I've seen rain."



NEED A WORK-HUNGRY, EASILY OPERATED DIGGER? . . . SHOVEL? . . . CRANE?

HOPTO

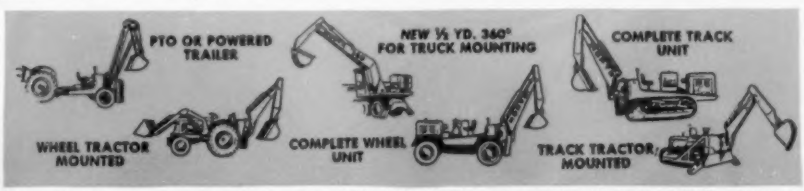
is ***YOUR*** ***LOW-COST ANSWER!***

Here's the fast cycling, 200° swing, *completely* hydraulic digger-shovel-crane that reaches out for work! HOPTO has a 16½′ reach at ground level *beyond* the boom mounting; digs more than 11′ deep and dumps at 9½′ with backhoe and 11′ with shovel bucket! ! ! It's the easy-to-operate unit your handy man will handle like a veteran in half a day!

HOPTO mounts on *any* ton-and-a-half or larger truck. Hydraulic outriggers level unit and take load from truck chassis and springing mechanism! Feather-touch controls in the full visibility cab actuate every movement of unit *and* outriggers. No belts, pulleys, cables or sheaves on a HOPTO! It's *completely* hydraulic!

The 1500 PSI hydraulic system has overload relief valves, double wire braided hoses, 5″ inside diameter hydraulic cylinders with 2⅜″ chrome plated piston rods, and a large oil reservoir for most efficient operation! Self aligning bearings and hardened alloyed steel pins . . . formed steel plate boom, stick, and sub-frame . . . direct mounting of pump on power unit . . . crowd cylinder *above* boom . . . these are but a few of the many *long-life*, *low-maintenance* features of the quarter-yard, work hungry HOPTO.

Write for complete information on the model or models for your requirements



MANUFACTURERS OF A COMPLETE LINE OF ½ YARD AND ¼ YARD HYDRAULIC DIGGER—SHOVEL—CRANE

BADGER MACHINE COMPANY

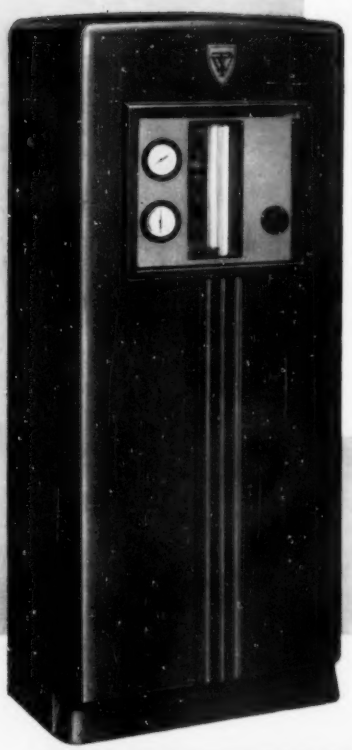
1124 WEST 5th STREET • DEPT. P • WINONA, MINNESOTA

WALLACE & TIERNAN

V-NOTCH

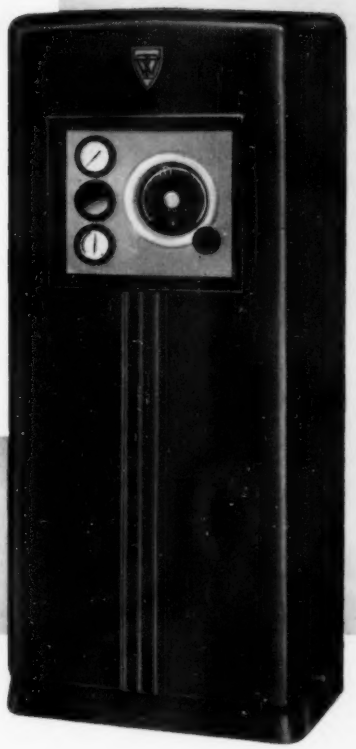
variable-orifice

CHLORINATORS



A-711 V-notch Chlorinator has rotameter indicator with 10 to 1 feed range

A-712 V-notch Chlorinator has dial indicator with 20 to 1 feed range



NEW *V-notch Chlorinators Chlorination*

SIMPLIFY

With the new Wallace & Tiernan V-notch Variable-Orifice Chlorinators:

OPERATION IS SIMPLIFIED as one injector control starts or stops the unit. Chlorine gas is turned on or off automatically.

SETTING FEED RATE IS SIMPLIFIED as one control sets feed rate precisely at both high or low feeds.

INSTALLATION IS SIMPLIFIED as units are shipped ready for operation. No water supply is needed at the chlorinator. A remote injector uses only standard water supply fittings.

MAINTENANCE IS SIMPLIFIED and virtually eliminated. All parts are corrosion resistant, mounted in an attractive modern cabinet.

For full details on manual or automatic proportional V-notch Chlorinators, contact your W&T representative, or write to the address below.

WALLACE & TIERNAN INCORPORATED

25 MAIN STREET, BELLEVILLE 9, NEW JERSEY

S-110